A

Junior Geography

of

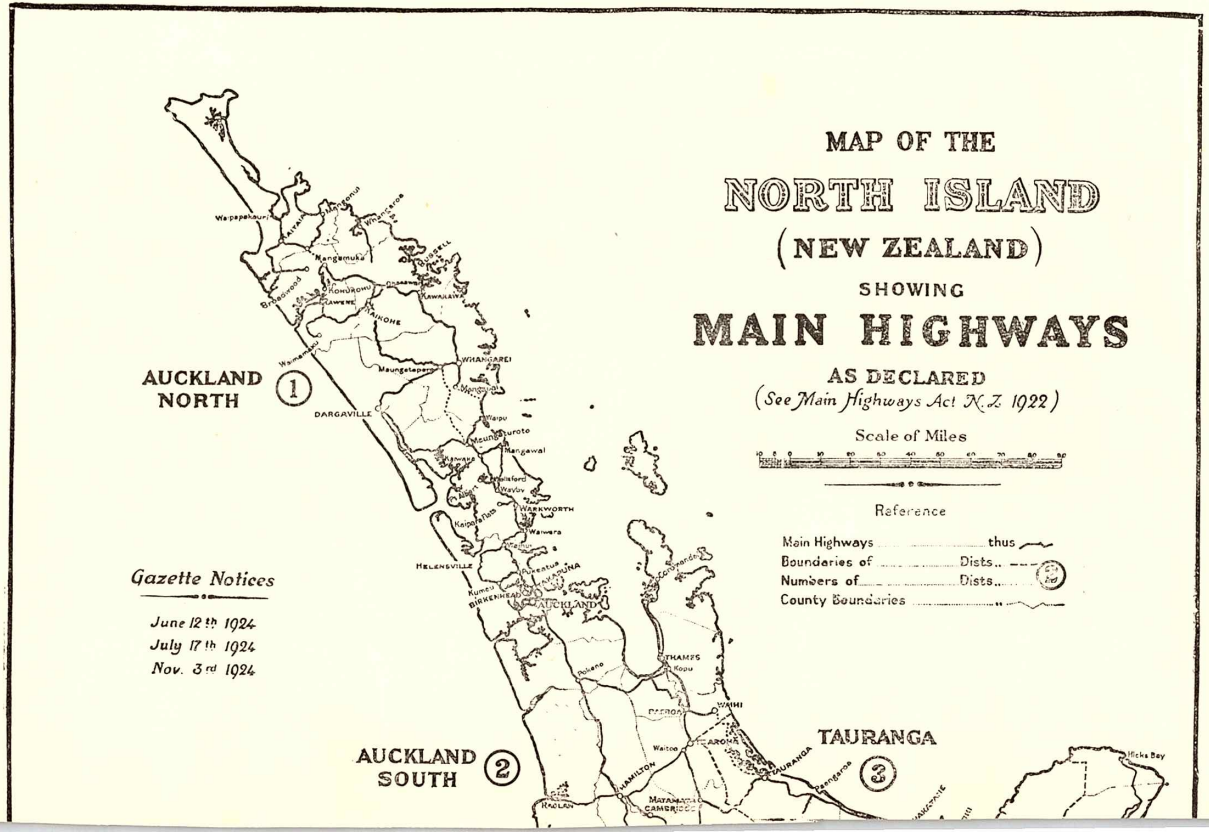
New Zealand

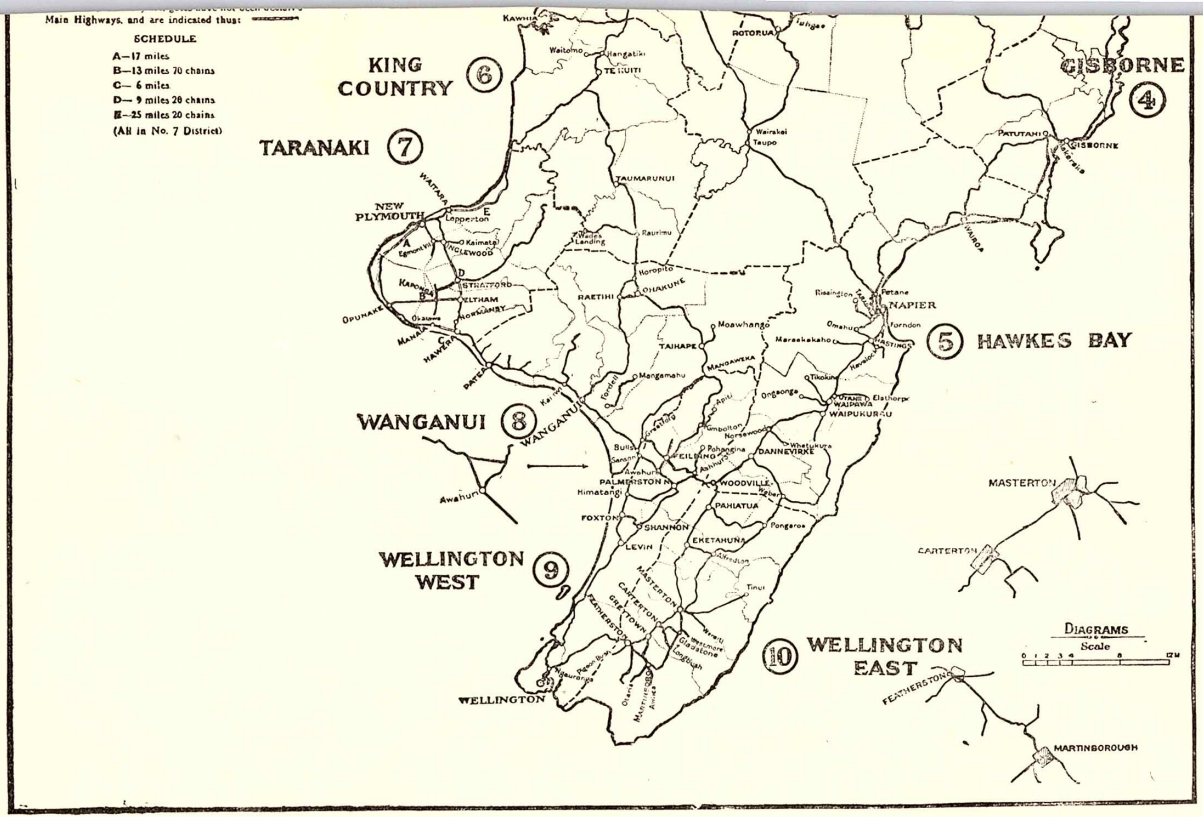
and Australia

2/6

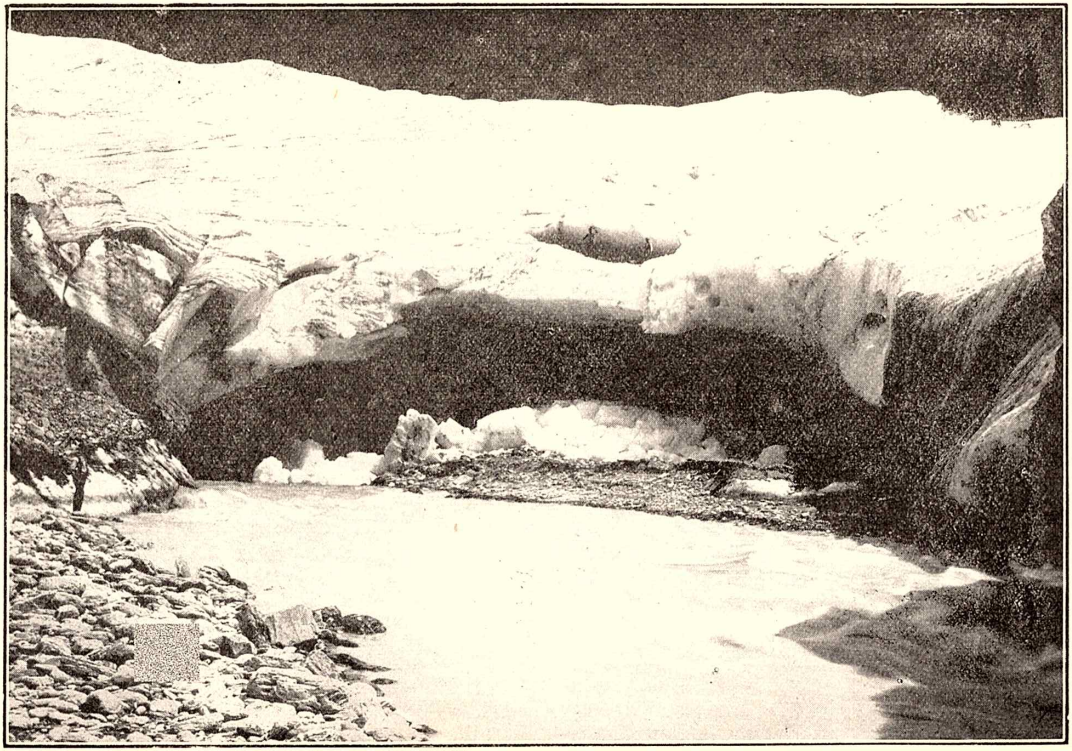
J. H. Gamble.
H.I.C. etc.
1925

$12


MAP OF THE
NORTH ISLAND
(NEW ZEALAND)
SHOWING
MAIN HIGHWAYS
AS DECLARED
(See Main Highways Act N.Z. 1922)
Scale of Miles
Reference
Main Highways thus
Boundaries of Dists.
Numbers of Dists.
County Boundaries
AUCKLAND NORTH
1
AUCKLAND SOUTH
2
TAURANGA
3
Gazette Notices
June 12th 1924
July 17th 1924
Nov. 3rd 1924
Waipapakauri
Mangonui
Whangaroa
Mangamuka
Broadwood
KOHUROHU
LAWENE
KAIKOHE
KAWAKAWA
WHANGAREI
Maungatapere
Waimamaku
DARGAVILLE
Waipu
Mangawai
Kaiwaka
Wayby
WARKWORTH
Kaipara Flats
Waiwera
HELENSVILLE
Puketaua
Kumeu
BIRKENHEAD
AUCKLAND
Coromandel
THAMES
Kopu
Pokeno
WAIHI
PAEROA
Waitoa
HAMILTON
RAGLAN
MATAMATA
CAMBRIDGE
TAURANGA
Paengaroa
Hicks Bay


Main Highways, and are indicated thus:
SCHEDULE
A—17 miles
B—13 miles 70 chains
C— 6 miles
D— 9 miles 20 chains
E—25 miles 20 chains
(All in No. 7 District)
KING COUNTRY 6
TARANAKI 7
WANGANUI 8
WELLINGTON WEST 9
WELLINGTON EAST 10
HAWKES BAY 5
GISBORNE 4
NEW PLYMOUTH
STRATFORD
HAWERA
WANGANUI
PALMERSTON N.
FOXTON
LEVIN
MASTERTON
CARTERTON
GREYTOWN
FEATHERSTON
WELLINGTON
MARTINBOROUGH
NAPIER
HASTINGS
WAIPUKURAU
DANNEVIRKE
WOODVILLE
PAHIATUA
EKETAHUNA
TAUMARUNUI
TAIHAPE
ROTORUA
TAUPO
GISBORNE
DIAGRAMS
Scale

A JUNIOR GEOGRAPHY OF NEW ZEALAND AND AUSTRALIA



From "Forest and Ice," by B. E. Baughan. TERMINAL FACE, FRANZ JOSEF GLACIER *Dr. Teichelmann*

A Junior Geography

OF

New Zealand and Australia

BY

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ASSISTED BY

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Third Edition, 1925

PREFACE

The study of Geography was one of the first attempts by man at organized knowledge. During its infancy and for many succeeding centuries the scope of the subject was very wide, embracing all branches of knowledge relating to the earth, including even astronomy and geology. In its earliest stage it was almost entirely descriptive. With the progress of scientific knowledge and methods its boundaries were contracted so that it became the "exact and organized knowledge of the distribution of phenomena on the surface of the earth."* In its latest stage of evolution Geography has been defined as "the relation between the physical environment and environed organism, between the earth and its inhabitants."* Thus man entered into his kingdom. The student has now to conceive of the earth as the home of man, and study its physiography as it affects the life of its inhabitants. In this book an effort has been made to induce the pupil to realise how the geological and other physical features, the climate, and the other natural resources of our islands and their neighbour continent have contributed to the progress and prosperity of their inhabitants. Man is considered as the product and, as far as lies in his power, the maker or moulder of his environment.

The epithet "commercial" as applied to Geography is now generally superseded by the more appropriate term "economic." The subject of Economic Geography embraces all geographical conditions (themselves subject to change) affecting the production, the transport, and the exchange of commodities.

It is now many years since an elementary book on the Geography of New Zealand has been published in a cheap and convenient form. In the preparation of this book the object has been to furnish the senior scholars of our primary schools, as well as high schools, colleges, pupil teachers, and candidates for the public examinations, with a Geography of New Zealand and Australia, conceived in the spirit of the latest views of the subject and yet well within the comprehension of the students.

The book opens with an outline sketch of the discovery and early settlement of New Zealand and a brief account of its mode of government. The Physical Division begins with a review of the early geographical history of the islands with the object of illustrating the principle of change in nature and the perennial activity of natural forces. Then follows a description of the various physical features appropriately classified. The third Division, dealing with Economic Geography, is introduced

*Dr. H. R. Mill.

by a discussion of the influence of physical features, climate, and other natural resources upon the distribution of population and the occupations of the people. The second and third sections in the Division consist of two distinct treatments of the same topic, the Products and Industries of New Zealand, and hence a considerable amount of repetition has been unavoidable. Justification is claimed for this on account of the prime importance of this subject and the convenience of the arrangement for some grades of students.

No apology is necessary for giving New Zealand the largest share of the space available. It is neither possible nor desirable within the limits of this little book to treat the geography of Australia with anything like the same fullness as that accorded to New Zealand. Only the outstanding features of the historical, physical, and economic geography of the Commonwealth have been touched upon. For the names of the coast features of New Zealand and of all the physical features of Australia the student is referred to his atlas, an indispensable aid to the study of the subject.

It is assumed that the readers of this text-book already have an elementary knowledge of the geography of the world. It may be taken by senior scholars in one year, or be divided so as to provide material for a two years' course. The difference of type may be some guide in the arrangement of courses. The letterpress in large type may be studied first, though much of the information in small type is essential to a sound knowledge of the subject, and should therefore receive careful attention from the teacher. The use of heavy type indicates the more important names with which the student should be familiar.

The best form of illustration, that by maps and diagrams, has been freely utilised, as these are essential for purposes of study. The numerous cross references given, too, should prove helpful to the reader, and the footnotes added should serve to clarify the text or suggest further trains of thought.

The preparation of maps, especially those indicating roughly the outline, the relief, and the relation of important towns to their environment has a real value to the student. Hence there is an urgent need for some method to enable him to draw a fair outline with rapidity. It is believed that the maps of New Zealand in squares given in the appendix achieve this object.

Grateful acknowledgment of indebtedness is made to the authorities consulted, and to those gentlemen whose assistance has been generously given.

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A Junior Geography of New Zealand and Australia

Part I.—New Zealand

A—HISTORICAL AND POLITICAL

1.—INTRODUCTION

General Description:—The Dominion of New Zealand consists of two large islands known as the North Island and the South Island, a smaller island called Stewart Island, the islands adjacent to each of these, and the Chatham Islands, lying 536 miles east of Lyttelton.

Situation and Boundaries:—New Zealand is situated about 1200 miles to the south-east of Australia. It is bounded on the north and east by the South Pacific Ocean, on the south by the Southern Ocean, and on the west by the Tasman Sea. Together with New Guinea, New Caledonia, and Norfolk Island, New Zealand forms a festoon of islands fringing the eastern coast of Australia, and enclosing the Coral and Tasman Seas. In latitude and longitude New Zealand corresponds roughly to the peninsula of Spain and Portugal in the Northern Hemisphere. Of these countries it is then the opposite or antipodes.*

Area and Population:—The total area of the Dominion, excluding the Ross Dependency,† is over 105,000 square miles, or about one-seventh less than the area of the United Kingdom. The South Island is a little larger than England and Wales, and about one-fourth larger than the North Island. The population figures in the accompanying table are as estimated in 1924.

---

*From Gr., *anti*, opposite; *pous, podos*, a foot.
†See *Whitcombe's Contour Atlas*, page 17.

	Area in sq. miles.	Population.
North Island ..	44,131	797,413
South Island ..	58,120	504,557
Stewart Island ..	662	450*
Chatham Islands ..	372	220*
Outlying Islands ..	284	—
Annexed Islands ..	293	13,624
Western Samoa ..	1,260	37,426
Maori Population ..	—	54,030
	105,122	1,407,050

Provincial Districts.—These are Auckland, Hawke's Bay, Taranaki, Wellington, Nelson, Marlborough, Canterbury, Westland and Otago. Though the nine provinces were abolished (see p. 14) as political divisions in 1876, they still exist both in law and in general knowledge as localities. Southland is merged in Otago, to which it was re-united in 1870. (See map on front cover). It is important to remember, however, that these divisions differ in some cases considerably from those now adopted for departmental administration, viz., Land Districts, Police Districts, Hospital, Education, and Postal Districts. For the boundaries of Land Districts see maps in the annual reports of the Department of Lands and Survey, and in the "N.Z. Nautical Almanac." The most recent changes in the boundaries of the Land Districts have been the formation of North Auckland Land District by a boundary line from the Waikato mouth to Miranda on Hauraki Gulf, and of the Gisborne Land District from the northern portion of the former Hawke's Bay Land District.

Besides the North and South Islands, Stewart Island, and adjacent islands to these, New Zealand includes the following:—

Outlying Islands:—

(1) The Three Kings Islands, 38 miles W.N.W. of Cape Maria Van Diemen.
(2) The Auckland Islands, 290 miles south of The Bluff.
(3) Campbell Island, 320 miles south of Stewart Island.
(4) The Antipodes Islands, 460 miles south-east of Port Chalmers.
(5) The Bounty Islands, 415 miles south-east of Port Chalmers.
(6) Snares Islands, 56 miles south-west of Stewart Island.

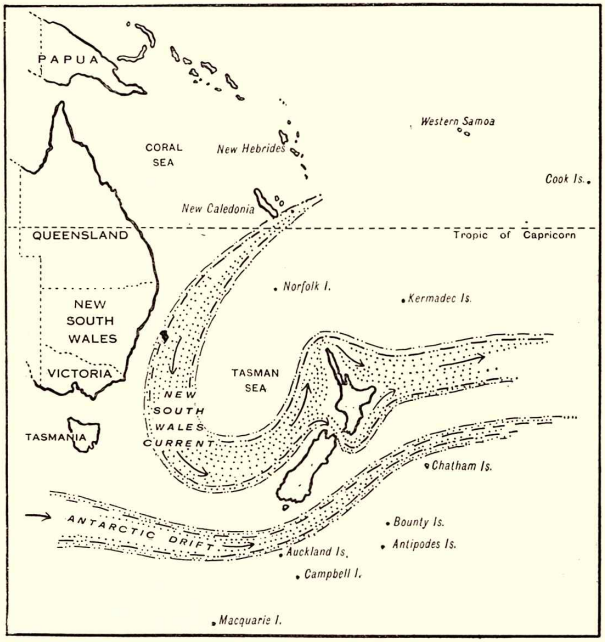
Annexed Islands:—

(1) The Kermadec Islands, 614 miles north-east of the Bay of Islands, annexed in 1887.

*Already included in South Island.

(2) The Cook Islands and others annexed in 1901. The chief island in the Cook Group is Rarotonga, 1638 miles north of Auckland.

The Ross Dependency,* proclaimed a British settlement in July, 1923, includes the coasts of the Ross Sea with the adjacent islands and territories lying in Antarctica



Map showing (1) New Zealand, the Outlying Islands, and annexed and mandated territory in relation to Eastern Australia, (2) New Zealand as part of a festoon of islands fringing Eastern Australia, (3) Ocean Currents in New Zealand waters.

between the meridians of longitude 160° E. and 150° W. It has been placed under the jurisdiction of the Governor-General of New Zealand. Its only economic value is as a whaling ground from mid-summer to mid-autumn.

Mandated Territory:—

Western Samoa (including Savii and Upolu Islands), 1650 miles N.N.E. of Auckland.

Of the above, only the Cook Islands and Western Samoa are of commercial importance. The others are uninhabited, but contain food depots for the relief of shipwrecked sailors. The

*The Union Group, consisting of five clusters of islands to the north of Samoa, became a dependency of New Zealand in 1925.

Cook Group and neighbouring islands have a native population of about 13,542, and a white population of about 360. Rarotonga (see pp. 116 and 121) is visited regularly by steamers from Auckland and Wellington. The exports are copra, coffee, coconuts, bananas, oranges, tomatoes, lemons, limes, limejuice, pineapples, and pearl-shell. The imports are chiefly European food stuffs, timber, and manufactured goods.

Western Samoa was taken from Germany in 1914, and is administered by New Zealand under a mandate from the League of Nations. Its chief town and port is Apia, which is on Upolu, the more populous and fertile island. It has a high-powered wireless station. Samoan plantations, which are now worked mainly by Chinese indentured labourers, produce most tropical crops and fruits, the chief exports being copra, cocoa beans, rubber, kava, coco-nuts, tobacco, and coffee.

2.—HISTORY AND GOVERNMENT.

(By James Hight, M.A., Litt.D.)

Discovery.

New Zealand was first made known to Europeans by Abel Tasman the famous Dutch navigator, who discovered it whilst on a voyage of exploration in the South Seas in 1642, just about the time when the civil war between the Cavaliers and Roundheads was beginning in England. He sailed along part of the west coast, but did not land, and gave the country the name of Staaten Landt, which was changed the following year by the Dutch Government to New Zealand, after the name of one of the provinces of the United Netherlands. The country was then inhabited only by Maoris, who had come here some hundreds of years before from some of the other Pacific islands. The Dutch made no use of the new land, and little more was heard of it till James Cook, the greatest of English navigators, rediscovered it in 1769, during his first voyage in the Pacific. He sailed round the islands, carefully explored and mapped the coast line, noted the life and customs of the Maoris, introduced some pigs,* fowls, and English vegetables, and annexed the country for the King of Great Britain and Ireland, then George III.

Colonization.

The British Government was not anxious to possess New Zealand, and took no steps to make good the British claim to it till 70 years later. But from 1814 onwards, many British subjects, drawn by the hope of acquiring wealth, the love of adventure, by the delights of a life free from the restrictions

*These must all have died or been killed, if we are to believe McNab's assertion that not Cook, but Governor King is to be credited with the introduction of the pig into New Zealand.

of civilization, or by the desire to convert the Maoris to Christianity, began to settle here, and to export the natural products—sealskins, whalebone and oil, flax, and kauri and white pine spars and logs. By 1840 they numbered about 2,000, and in that year, the British Government was driven by the action of Edward Gibbon Wakefield, the "Founder of New Zealand," and the news that the French were about to annex New Zealand, to make the Treaty of Waitangi with the Maoris. This Treaty made Queen Victoria and her successors, rulers of New Zealand, and made possible the subsequent wonderful growth of the "Britain of the South."

Emigrants come out from the British Isles, and by the end of the first 10 years of the history of New Zealand as a British colony, there were colonists living in the provinces of Auckland, Wellington, Taranaki, Nelson, Otago, and Canterbury. The shape of the country explains why New Zealand was colonized at several points and not from one centre alone. These colonists applied themselves to the work of making roads and bridges, introducing cattle, sheep, pigs, and other useful animals, and cutting down bush, draining the land, and making it ready to cultivate the wheat, oats, and other grains, vegetables, and fruits which they brought from the Old World. After they had established their farms and built their towns, they began to send abroad pastoral and other farm products as well as flax, timber, and gold, in exchange for the manufactured goods, such as cloths, furniture, machinery, books, etc., which they could not easily make themselves. This oversea trade increased rapidly after the invention and improvement of the freezing machine, which enabled New Zealand meat and dairy produce to be sent to the British markets in a fresh condition, and the expansion of our exports during the last 20 years has been very great. As a result, the imports have increased in proportion, and the people have become much wealthier and enjoy a high degree of comfort. But the progress of the North Island was not at first as rapid as that of the South Island, because disputes about land between the Maoris and the colonists soon broke out into wars, which went on down to 1870.

As New Zealand is a new country with a specially selected population, the life of its people is not yet marked by some of the blemishes that are to be found in older lands. There is no poverty such as presses heavily upon a large part of the population in Europe, and the people as a whole have tried to form governments and make laws which shall give every person fair conditions of work and the chance of living a sound, healthy life.

From 21st May, 1840, to 3rd May, 1841, New Zealand was treated as a dependency of the colony of New South Wales; but from 1841 it has ranked as a separate colony. Captain Hobson was the first Governor. He represented Queen Victoria in New Zealand,

and was helped in the work of government by a Legislative Council and an Executive Council, the members of both of which were appointed by the Governor. New Zealand remained a Crown Colony, as a colony with this kind of government is called, till 1853. In that year the colonists were first allowed, by the Constitution Act of 1852, to elect the members of the most important part of the body—the General Assembly or Parliament—which was henceforth to make the laws of the colony; in other words, "representative government" was then established. In 1856 the last step in the establishment of self-government was taken: the Governor appointed the members of his Executive Council from among the leaders of the party having the majority of votes in the Parliament, that is "responsible government" began. From 1853 to 1876 there was in each Province a Provincial Council, which made laws regarding matters of local importance only; but the powers of these Councils were taken over, some by the General Assembly, and some by smaller bodies, such as County Councils and Road Boards.

There were only six Provinces when the Constitution Act came into force in 1853. Hawke's Bay, constituted a province in 1858, was, prior to that, a part of Wellington; Marlborough, constituted in 1859, was formerly a part of Nelson; and Westland, constituted a county in 1868 and a province in 1873, was before that a part of Canterbury. Southland became a separate province in 1861, but was re-united to Otago in 1870. The Act which abolished the nine provinces existing in 1876 and substituted a general government for the whole colony, created Provincial Districts in their stead, with boundaries co-terminus with those of the former provinces, but without legislative or other powers.

In 1907 New Zealand was proclaimed by Edward VII. to be a "Dominion"; this increase of dignity was not accompanied by any important change in the system of Government, but merely marked the fact that New Zealand by reason of its population, wealth, and general importance, is worthy of being considered a sister State of Canada, Australia, South Africa, and Newfoundland, and a grown-up daughter of the Motherland. In 1917 the Governor of the Dominion was raised to the dignity of Governor-General.

In 1842 the Chatham Islands, Bounty Islands, Antipodes Islands, Auckland Islands, and Campbell Islands were made part of the Colony of New Zealand; in 1887 the Kermadec Islands were added; in 1901 the Cook and some other Islands in the Pacific were annexed to New Zealand; in 1914 Western Samoa came under New Zealand rule; and in 1923 the Ross Dependency was placed under the jurisdiction of the Governor-General.

General Government.

At the present time, then, New Zealand is a "self-governing Dominion" of the British Empire. The King and Parliament of Great Britain and Ireland can make laws to bind the people of New Zealand, but since 1853 have done so only on very rare occasions, chiefly when it has been necessary to pass a law for all the Dominions, regulating their intercourse with foreign states or with one another. Generally speaking, the Parliament of New Zealand can make any laws regulating the conduct of people in New Zealand so long as it does not attempt to go beyond the powers given to it by the Constitution Act of 1852 or to make laws in opposition to the terms of any law of the British Parliament relating to New Zealand; but it cannot make laws for persons who are residents beyond New Zealand.

The **Parliament** of New Zealand consists of (1) The Governor-General* of the Dominion, (2) the Legislative Council, and (3) the House of Representatives. The Governor is appointed by the King, acting on the advice of the British Government, and is the agent of the King in New Zealand. It is he who summons, prorogues, and dissolves Parliament, who, in the King's name, assents to bills passed by the House and Council, and appoints the Ministers. The Legislative Council consists of about 40 members, who are appointed by the Governor, on the advice of the Ministry for seven years; its chief work is to revise the bills passed by the House and to correct the faults in them due to haste. By an Act of 1914 the Legislative Council may, on the issue of a proclamation, become partly elective. After the War such a proclamation was issued, but was afterwards suspended. The House of Representatives consists of 80 members, four of whom represent the Maoris. They are elected for a term of three years by the whole adult population of the Dominion voting in divisions called constituencies or electorates. The House is the chief branch of the "Legislature" or law-making body; in it all the important laws are introduced, and its will must at last prevail over the will of the Council or Governor whenever they disagree.

The work of seeing that the laws are properly carried out is as important as the work of making the laws, and this is the main duty of the Executive Council. This Council is appointed by the Governor, but he always chooses the leader of the most numerous party in the House as the man who shall suggest the names of the members of the Executive Council, and they are always those of the chief men of his party. During the Great War, a time of great national danger, a National Cabinet was formed, comprising the leading men of all parties in the House. The chief member of the Executive Council is the Prime Minister, and he, with its other leading members, forms the

*The term "Governor" is used hereafter for brevity.

Ministry or Cabinet. As soon as the Ministry ceases to enjoy the confidence of the majority in the House or in the country, it is its duty to resign, when the Governor will proceed to form another Ministry which shall possess that confidence.

Local Government.

Parliament has handed over its duty of law-making, in many matters of local interest only, to other and smaller assemblies, such as County Councils, Borough Councils, City Councils, Boards of Education, Drainage Boards, etc., of which there are a great many in the Dominion and the members of which are elected by the whole or certain classes of the adult population.

B—PHYSICAL

1.—EARLY HISTORY OF THE LAND

Changes are always going on in the form and structure of the Earth's crust. As this heated body cools it contracts, and folds or wrinkles are formed in its crust. Then pressure in portions of the crust lead to violent upheavals of rock in the weaker parts, and the outpouring of molten rock or lava from the interior. Thus from one cause or another the crust of the earth is continually rising or sinking. Some of these changes occur suddenly, others take place very slowly and continue for a long time. Whenever land sinks beneath the sea, new rocks are laid down above the older ones along the shore line, and whenever land rises above the sea, the rocks of which it is made up are being worn down or denuded by weathering agents, frost, ice, rain, rivers and wind.

Of the past story of New Zealand we have no record beyond what can be read in the rocks and soil of the present day, in mountain, valley, and plain, in the fossil remains of fern, and bird, and shell-fish, and in the animals and plants that are native to the soil; and it has taken men of science many long years of patient study to read aright the story which Nature has thus written.

It is probable that untold ages ago much of the land which we call New Zealand lay deep beneath the sea. Slowly it rose until at last it was raised above the level of the sea and stretched far and wide as dry land. As time went by the land again slowly sank, and later it rose again. The heat and the abundance of moisture at that distant time caused rich forests of huge ferns and other strange plants long since extinct to spring into life. Ages went by, these forests were covered up, and others took their place. Some of these forests were on

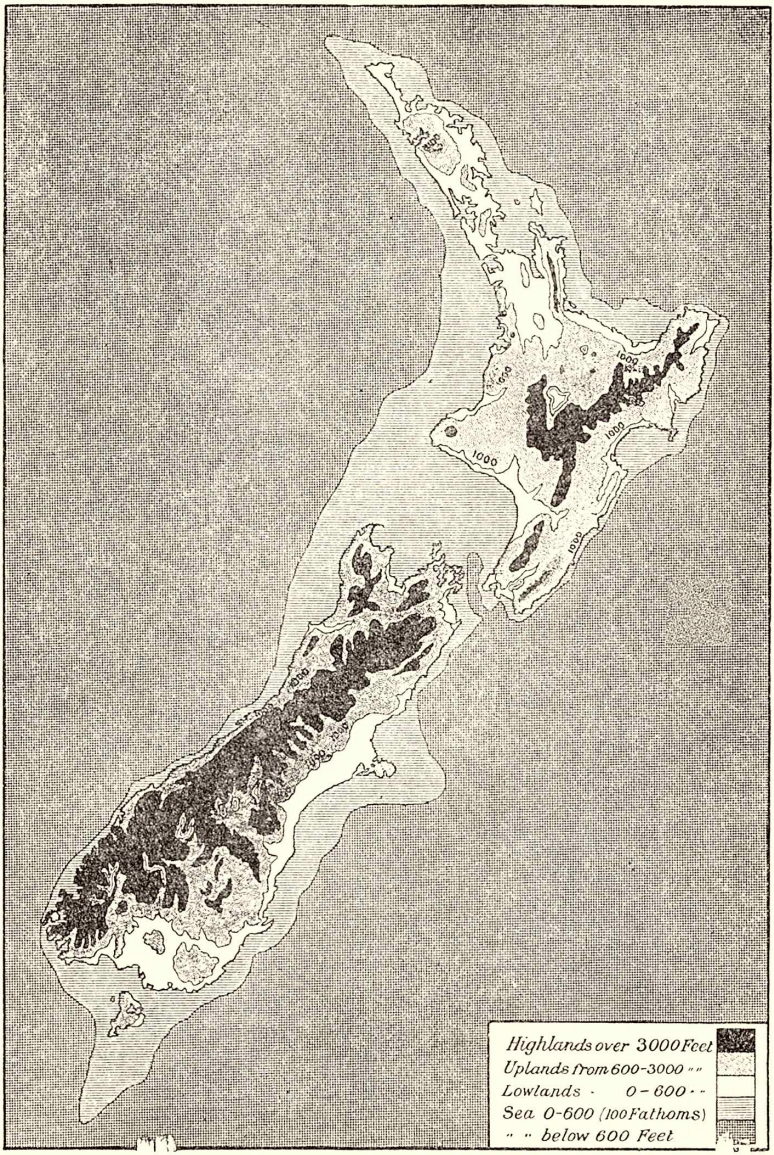
land that afterwards sank, and in time they were covered with a great weight of rock and soil, and so after the lapse of countless years were converted into coal. Age after age passed and many other changes in level took place. During one great elevation New Zealand must have formed part of a vast area, including Tasmania, Australia, and the Sub-antarctic continent. After a period when these land connections had been broken, another elevation once more united New Zealand to Sub-antarctica in the south, as well as to New Guinea and Malaysia in the north, and perhaps also to South America either by the latter's connection with Sub-antarctica or by a series of tropical stepping-stones. These land connections, at whatever time they occurred, were the channels by which the plants and animals of those lands made their way to these islands, and became the parents of our present native flora and fauna.

During one or more of these periods of elevation, volcanoes burst forth, formed mountains, and covered large areas with layers of lava, which, on cooling, became solid, and in course of time, has been weathered down into soil rich in plant food. Thus were formed the rocks of the volcanic plateau of the North Island.

Then at a still later date much of the land was so high as to become covered with a great depth of ice and snow. Hundreds of glaciers formed in the mountain valleys and some on the west coast reached down even to the sea-level.

The glacial era was followed by a gradual but general sinking of the whole southern continent. This was of course accompanied by a softening of the climatic conditions; the ice-sheet melted, rivers began to flow, plains were formed at the bases of the mountains, the glaciers retreated to the loftier ranges, plant and animal life spread and flourished luxuriantly. The sinking continued until wide stretches of ocean separated New Zealand from the continents. It shrank to a large island that was long and narrow. At varying distances from it some of the loftier peaks of the old land remained above water as lonely islands, such as those we now know as the Chathams, Norfolk Island, and the Auckland Islands. Later changes resulted in the formation of three islands from the narrow one by the sinking of two troughs which are now named Cook and Foveaux Straits.

Thus New Zealand became a lonely land cut off from the nearest land of considerable size by over 1200 miles of stormy sea. As we shall see later, her very loneliness or isolation has had many important effects upon the life of her native plants and animals, and even upon the people that have lived here. And land movements are still in progress moulding and fashioning the face of the country to forms that we can only guess at. The most recent change of level has probably been a general uplift of the northern half of the South Island and of



New Zealand, showing roughly the height of the land and the depth of the coastal waters.

the southern half of the North Island as shown by the terracing and weathering of these regions. The terracing at Milford Sound is evidence of recent uplift through several hundred feet. Violent changes, due to volcanic action, we have seen within our own time, as for example the raising of the south Wellington coast by from 5 to 9 ft. in 1855, but for the most part changes are so slow that many years go by before we can detect any trace of them.

2.—GENERAL SURVEY

We have seen that New Zealand's early history has been that of a continent of which it is but the remnant. Hence its rocks are similar to those of the great continents of the world, that is, varied and for the most part ancient. But the rugged nature of the country, the sharp outlines and great height of its mountains, its deep valleys and gorges, its numerous lakes and waterfalls all tell us that the present form of the land is not very old. It is clear that sufficient time has not gone by since its last uplift for the weathering agents to smooth down the land to anything like a low level; for the physical features of the land possess **most of the signs of youth.**

A general survey or bird's eye view of the country reveals the following *outstanding characters*:—

(*a*) The narrowness of the country as compared with its length.

(*b*) The uniform direction of the chief feature-lines —the coast-lines, the mountain chains, and, indeed, the continental shelf from which the country rises.

(*c*) The height and rugged nature of the country, particularly the South Island, and the middle of the North Island.

(*d*) Traces of past and present volcanic and thermal activity.

(*e*) Abundant surface water — snowfields, glaciers, lakes, and rivers.

Relief.*—The chief feature-lines of New Zealand run in a north-east and south-west direction. In the north

*Students who have the opportunity should study the large relief model of New Zealand in the Dominion Museum, Wellington.

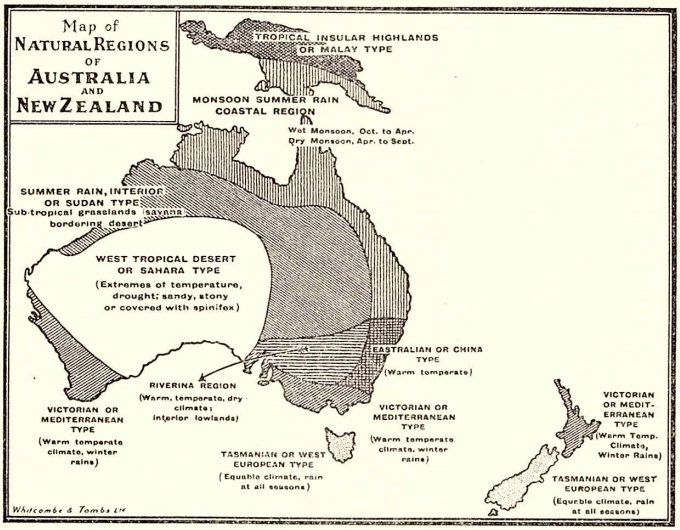
of the South Island lie two parallel mountain chains—of these the western is of alpine height, and continues to the far south-west forming the backbone of the island. Its central portion is named the Southern Alps, which present a steep face to the west, fringed by the narrow strip of Westland coastal plain, and a more gradual slope to the east, leading down to the rich and wide-spread Canterbury Plains. Its northern portion forks into two main ridges which terminate abruptly in the Collingwood and Marlborough peninsulas. South of Mt. Aspiring the chain spreads out into a number of north-west south-east ranges making up the Otago highlands. The Marlborough Sounds occupy the sunken valleys between the spurs of the eastern ridge. Only slight traces of the rocks forming this chain occur in the North Island; the land where they might be expected to re-appear, namely, at Wanganui, is overlaid by layers of rocks of later age, and the district further north by volcanic material.

The eastern chain includes three parallel ranges. The two most easterly of these are the Seaward and the Inland Kaikouras. This chain is also broken by Cook Strait. It re-appears, however, in the North Island, where it stretches continuously from Cook Strait to near Cape Runaway, forming the main divide or backbone of that island. Parallel to this chain and separated from it by the depression which includes the Wairarapa Valley, the Valley of the Manawatu, and that of the Tukituki River, lower coastal ranges run along near the east coast from Cape Palliser to Cape Kidnappers. Almost at right angles to the direction of the main divide are the lower disconnected ranges in the north forming the watersheds of the Auckland and Coromandel peninsulas.

The remaining prominent features of the relief are of volcanic origin. In the South Island the two peninsulas on the east coast are the worn-down remains of extinct volcanoes. In the west of the North Island there is an almost perfect volcanic cone, while in the middle and north of the island are more or less active volcanoes, extinct volcanoes, and worn-down old volcanoes, as well

as many other signs of past and existing volcanic and thermal activity. (See pages 28, 29, and 47).

Climate.—The climate of New Zealand varies from warm temperate to cool temperate and makes it one of the healthiest countries in the world. The mildness and healthfulness of its climate and the rich fertility of its soil attract settlers from older and more crowded


Map of
NATURAL REGIONS
OF
AUSTRALIA
AND
NEW ZEALAND
TROPICAL INSULAR HIGHLANDS OR MALAY TYPE
MONSOON SUMMER RAIN COASTAL REGION
Wet Monsoon, Oct. to Apr.
Dry Monsoon, Apr. to Sept.
SUMMER RAIN, INTERIOR OR SUDAN TYPE
Sub-tropical grasslands (savana) bordering desert
WEST TROPICAL DESERT OR SAHARA TYPE
(Extremes of temperature, drought; sandy, stony or covered with spinifex)
EASTRALIAN OR CHINA TYPE
(Warm temperate)
RIVERINA REGION
(Warm, temperate, dry climate; interior lowlands)
VICTORIAN OR MEDITERRANEAN TYPE
(Warm temperate climate, winter rains)
VICTORIAN OR MEDITERRANEAN TYPE
(Warm temperate climate, winter rains)
TASMANIAN OR WEST EUROPEAN TYPE
(Equable climate, rain at all seasons)
VICTORIAN OR MEDITERRANEAN TYPE
(Warm Temp. Climate, Winter Rains)
TASMANIAN OR WEST EUROPEAN TYPE
(Equable climate, rain at all seasons)
Whitcombe & Tombs Ltd

[*After Dr. A. J. Herbertson and Dr. Griffith Taylor.*
Natural Regions of Australia and New Zealand.

countries. Native plants grow in great plenty, while those of other countries of similar temperature grow as well as in their native land.

Natural Regions.—New Zealand may be divided into two natural regions.

(1) The northern, or warm-temperate region, belongs to what is known as the Mediterranean type, the characteristics of which are those of lands bordering on the Mediterranean Sea, namely, warm summers, mild winters, and rains heavier in winter than in summer. The vegetable products of this kind of region include the

chestnut and the walnut, the olive, fig, mulberry, orange, lemon, lime, apricot, grape, date, maize, and tobacco. Other examples of this type are the south-west of West Australia, the south of South Australia, and Victoria. All these are marginal lands, that is, lands which border on the sea.

(2) The southern or cool temperate region of New Zealand belongs to the West European type, the characteristics of which are those of the British Isles, Northern France, and much of Germany, namely, warm summers, cold winters, and winter rains, but no great extremes of temperature. The vegetable products of this region include birch, pine, and fir on the highlands, with broad-leaved forest trees on the lowlands, cereals, potato, flax, and hemp. Tasmania is the nearest other example of this type. These lands, too, being all marginal, are tempered by nearness to the sea.

3.—COAST LINES

New Zealand is long and narrow, with a very long coast line extending to over 4,000 miles. No part of the country is more than seventy-five miles from the sea.

With the exception of Auckland peninsula, which trends north-west and south-east, the coast line of New Zealand runs parallel to the main mountain ridges, that is, from south-west to north-east. This accounts for the general smoothness of the coast line; for it is only when the mountains run across the coast line that we find the latter cut into numerous capes, bays, gulfs, and headlands. Thus the Marlborough Sounds (Pelorus and Queen Charlotte) are due to the sea cutting across the direction of the main range, and so entering the sunken valleys of the eastern mountain chain. This occurs also in Foveaux Strait, south of Otago.

Very often mountain ranges project into the sea, and so form peninsulas, as the Collingwood, Blenheim, Auckland, and Coromandel peninsulas, or they continue out to sea when the summits of their peaks make a line of

islands, as do the St. Arnaud Mountains east of Tasman Bay. The most indented portions of the coast are the east coast of Auckland peninsula, the north of Marlborough, and the west of Otago.

The prevailing winds* are westerly and the local coast currents† northerly. All of the inlets of the west coast of the North Island, as well as of the west coast and the Otago Peninsula in the South Island, are blocked by sand bars, while the mouths of the Hawke's Bay and Canterbury rivers and Nelson harbour are blocked by bars and spits of shingle. These are formed by the ocean currents and the tide acting upon the material brought down by the rivers. The inlets of the north-east of the North Island are free and open, for here the rivers bring down less waste material, and the ocean currents are less powerful.

The best harbours of the Dominion, Auckland and Wellington, are drowned river valleys, and Lyttelton, in the next grade, occupies a drowned volcanic crater. Dunedin and Port Chalmers lie in Otago Harbour, an inlet that has been formed by the connection of an island of volcanic formation with the mainland which, of course, is not volcanic.

The important inlets of New Zealand may be grouped according to mode of formation as follows:—

1. **Drowned River Valleys:**—Whangaroa, Whangarei, Waitemata, Tamaki, Coromandel, Firth of Thames, Mercury Bay, Hokianga, Kaipara, Manukau, Aotea, Kawhia, Pelorus Sound, Queen Charlotte Sound, Catlins, Paterson Inlet, Port Pegasus.

2. **Drowned Glacier Valleys:**—West Coast Sounds or Fiords.

3. **Wide River Mouths:**—Waikato, Wanganui, Buller, Grey, New River, Clutha, Wairau.

4. **Drowned Volcanic Craters:**—Lyttelton, Akaroa, Carnley Harbour (Auckland Is.).

5. **Opening Between an Island and the Mainland to which it has Become Joined:**—Otago Harbour, Bluff Harbour, The Spit (Napier).

6. **Sheltered Water Behind Shingle Spits:**—Nelson Harbour, Golden Bay.

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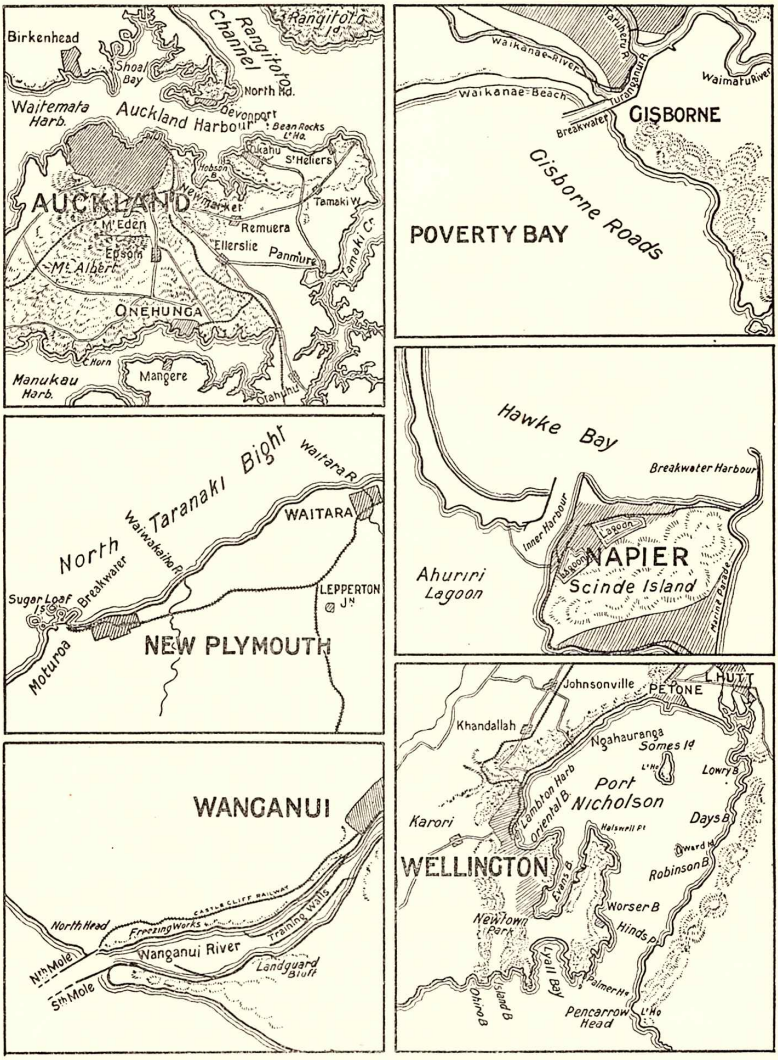
*See p. 51. †See map p. 11, also p. 50.



Chief Harbours of the North Island. Note the advantages and defects of each.

(Not drawn to same scale)

4.—HARBOURS

The best harbours are those that possess the following qualities in the highest degree:—

(1) Safe, roomy, and deep anchorage; (2) ready access to and from the sea in any weather and at any state of the tide; (3) nearness and easy access to fertile country or populous centres of industry, usually termed hinterland; (4) facilities for coaling and repairs.

Most inlets possess some of the qualities of a good harbour, but not all. Seaports grow up only on those harbours whose advantages outweigh their disadvantages. The harbours* of New Zealand may be graded according to their possession of similar advantages and defects, as follows:—

Grade I. (*a*)—Auckland and Wellington. These harbours are of first rate importance, and possess all the above qualities in a high degree.

Grade I. (*b*)—Lyttelton and Otago Harbour. Ports on these harbours are hampered by the need of artificial breakwaters and of constant dredging. In the latter, too, shipping is dependent on the state of the tide.

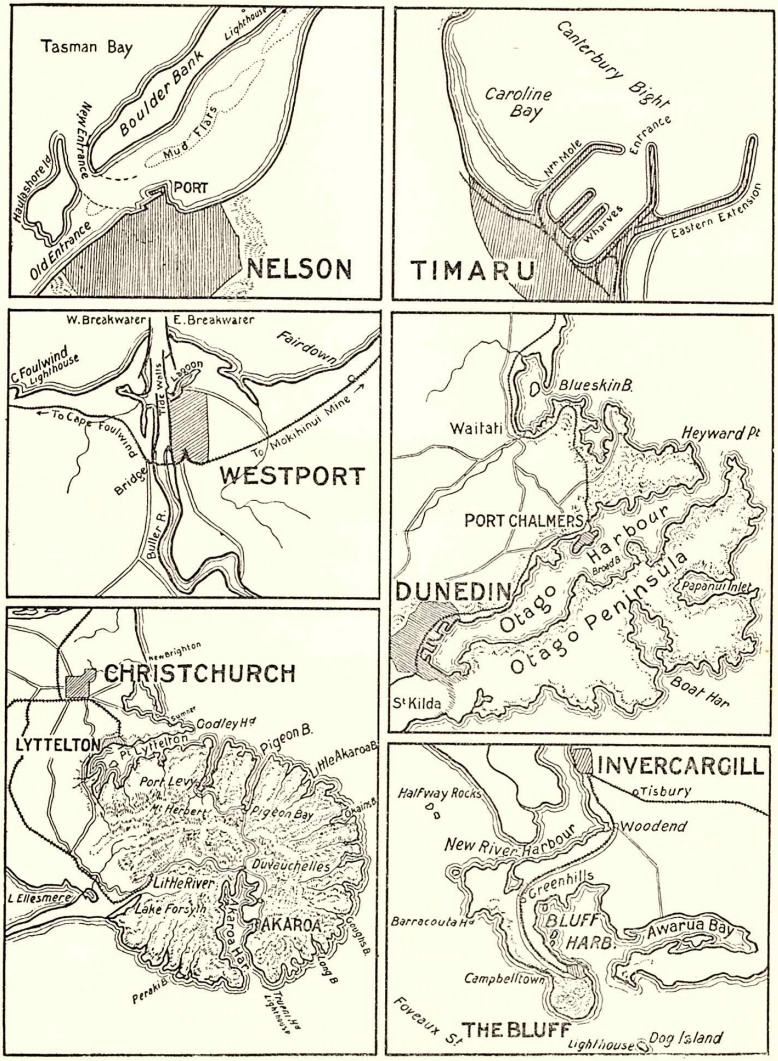
Grade II.—Bluff, Timaru, Napier, Nelson, and New Plymouth. These also require artificial breakwaters and constant dredging. They are also too shallow for shipping to be independent of the state of the tide.

Grade III.—Westport, Greymouth, Wanganui, Gisborne, Waitara, and Patea. Being at or near the mouths of tidal rivers whose mouths are blocked by shifting sand-bars, ports are maintained on these harbours only at great expense. Large vessels are obliged to anchor in the roadsteads off these river mouths and unload or load by means of lighters.

Grade IV.—Kaipara, Manukau, Kawhia, and Tauranga. These harbours are large, but shallow, and impeded by sand-bars. Tauranga has greater advantages than the other three named.

Grade V.—Picton, Havelock, Akaroa, Whangaroa, Bay of Islands, Whangarei, Hokitika, and Wairoa. Though Picton and Havelock are on deep sheltered inlets, these are at the head of tortuous passages, and are far from large centres of population. Akaroa is both large and deep, but is hemmed in by high hills, and hampered by its nearness to Lyttelton. The Bay of Islands, Whangaroa,

*For ports graded according to trade see p. 133.



Chief Harbours of the South Island. Note the advantages and defects of each.
(Not drawn to same scale)

and Whangarei are all magnificent harbours. They all suffer, however, from lack of back country, and Whangaroa suffers also from imperfect means of communication. In spite of its early start, the Bay of Islands succumbed to its rival, Auckland. Whangarei is growing as its local industries expand. Hokitika has proved to be a failure as a harbour.

Only the first two grades are of much value as ports under existing conditions of population, production, and transport. The last three grades are of minor importance; their trade being largely interprovincial, and their chief oversea trade consisting of imports.

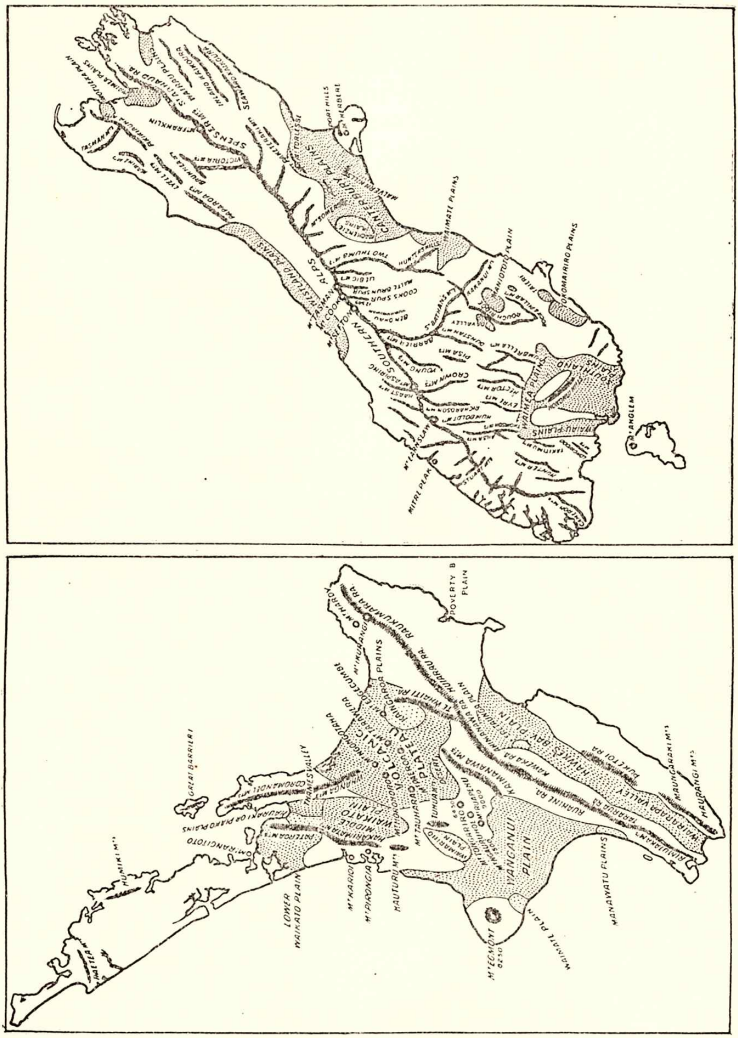
5.—MOUNTAINS

North Island

The North Island is hilly rather than mountainous. Much of it lies below 2,000ft. in height and no points of the main divide exceed 6,000ft. The region of greatest elevation is the volcanic plateau in the middle of the island. From the south of this plateau there rises a series of volcanic summits ranging from 6,500ft. to 9,000ft. in height. The volcanic cone of **Mt. Egmont** to the west of the plateau and separated from it by the Wanganui plain, reaches a height of 8,260ft.

The **Main Divide** ranges from 3,000ft. in height in the south to 6,000ft. in its highest part at the centre. It runs parallel to the east coast and stretches, under various names, in one continuous chain from Cape Terawhiti to near Cape Runaway. To the east of Lake Taupo it fringes the eastern edge of the central volcanic plateau. The various parts of the chain are:—The **Rimutaka Range**, the **Tararua Range**, the **Ruahine Range**, the **Raukumara Range.** The Rimutaka Range is crossed by the railway from Wellington to Napier *viâ* the Rimutaka Incline at an elevation of 1,144ft. In the Raukumara Range the chief peaks are Mt. Hikurangi (5,500ft.), and Mt. Hardy (3,700ft).

Lesser ranges of the main chain are the **Kaweka Range**, separated from the Ruahine by the Ngaruroro River; the **Ahimanawa Range**, an eastward extension of the Kaimanawa Range; and the **Te Whaiti** or



Mountains and Plains of New Zealand.

Whakatane Range, to the west of the Huiarau Range and parallel to it. At the northern end of the Te Whaiti Range are **Mt. Tarawera** (3,000ft.) and **Mt. Edgecumbe** (3,000ft.), both volcanic peaks.

Parallel with the east coast and the Main Divide and separated from the latter by a long depression are the Maungaraki Range and the Puketoi Range. The Puketoi Range forms the main watershed of mid-Wellington, as the Tararua and Ruahine ranges are broken through by the Manawatu Gorge.

The mountains of the north and west of Auckland include a number of low ranges. The Coromandel or Cape Colville Range (2,000ft. to 3,000ft.) extends from the volcanic plateau north through the Coromandel Peninsula to the Great Barrier Island. It is rich in quartz-bearing rocks, the ore being mined at Coromandel, and formerly at Thames. The chief peaks are Cape Colville (2,900ft.) and Te Aroha (3,100ft.).

In the west lies a chain of hills from 1,000 to 1,500ft. high, including the Hakarimata Mountains and the Pateroa Mountains, which extend brokenly from Kawhia north to Hauraki Gulf. North of Kawhia is Mt. Pirongia (3,100ft.), and ten miles north again is Mt. Karioi,* both volcanic cones.

Volcanoes.—The North Island is remarkable for the number and variety of its volcanoes. A straight line passing through the craters of Ruapehu† (9,000ft.) Ngauruhoe (7,500ft.), Tongariro (6,400ft.), and Ketetahi will, if produced, pass through the boiling springs at Tokaanu at the south end of Lake Taupo, Mt. Pihanga, Mt. Tauhara, the thermal springs district, Mt. Edgecumbe, and White Island, an active volcano in the Bay of Plenty about twenty-seven miles from the mainland. This is considered to be a line of weakness‡ in the earth's crust. On the mainland only three volcanoes can be regarded as active. Two of these occur in a volcanic range running north from **Mt. Ruapehu**. The latter is the

*Sighted by Tasman on Dec. 28th, 1642.
†See relief model in Dominion Museum, Wellington.
‡Or "fault."

highest mountain in the North Island. Since 1886 it has been subject to slight eruptions chiefly of steam and sulphurous gases; its summit is covered with an ice-field or glacier. Deep down in its crater in the midst of ice and snow is a hot lake.* North of it lies the active volcano **Ngauruhoe**, which is joined by means of lava to an extinct cone named **Tongariro**, near whose summit lies the beautiful Blue Lake. The most northerly peak of the range is **Ketetahi**, whose crater contains hot springs. The third active volcano is **Mt. Tarawera**. Up to 1886 it was believed to be extinct, but in that year the mountain burst forth and destroyed Lake Rotomahana and the famed Pink Terrace and White Terrace. A new Lake Rotomahana has been formed, which is many times larger than the old lake, and is still rising. Mt. Tarawera is a flat-topped cone.

Of the extinct volcanoes **Mt. Egmont** is the highest, and is almost perfect in form. It was discovered and named by Captain Cook. Travellers often compare it with Mt. Fujiyama in Japan. With the exception of Pirongia and Karioi in the west the remaining volcanoes are either on the volcanic plateau or in the neighbourhood of Auckland. Tauhara, Paeroa, Pihanga, Edgecumbe, Ngongotaha, and Horohoro rise from the plateau; the last two have worn down flat summits. Near Auckland and Onehunga the stumps of old volcanoes are numerous. Such are The Three Kings, Mt. Eden, Rangitoto Island (a lava cone), Mt. St. John, and Mt. Hobson.

South Island

The South Island of New Zealand is distinctly rugged and mountainous, more than half of its surface exceeding 3,000ft. in height. The area occupied by the mountains is at least five times as great as that consisting of level ground. The different ranges may be conveniently grouped under six headings:—

1. The Main Divide, including the Southern Alps.
2. The Kaikouras.

*An outlet in the lake-bed, emerging lower down the mountain side, becomes the source of the Wangaehu River.

3. The mountains of the north and west of Nelson.
4. The minor Canterbury Ranges.
5. The Otago Ranges.
6. Volcanic remnants.

(1.) The **Main Divide** extends from one end of the island to the other. It runs north-east and south-west almost parallel with the coast-line. Its northern division, including the **St. Arnaud** and **Spenser Mountains**, lies mid-way between the east and west coasts, but the central and southern portion, named the Southern Alps, runs close to the west coast, its main ridge being often less than 30 miles from the sea. This chain, ranging as it does from 3,000 to 12,000ft. in height, is the loftiest in New Zealand and Australia. It is lowest in the extreme north and south and highest in the middle in the neighbourhood of Mt. Cook (12,350ft.). The width of the main divide also varies considerably. In Nelson and Marlborough its width is from ten to fifteen miles. In Canterbury numerous spurs run off to the eastward, so that its average width is between fifty and sixty miles, though for many miles the summit of the range is as sharp and steep as the ridge of a tent. In Otago the chain breaks up and sweeps round to the south-east, occupying the whole of the Otago Highlands.

(*a*) **Peaks.** — The chief peaks of the alpine chain are: Mt. Dun (3,700ft.) in the St. Arnaud Mts.; Mt. Franklin in the Spenser Mts.; a group of lofty summits near **Mt. Cook**, seven of which exceed 10,000ft. in height. The highest are **Mt. Tasman** (11,400ft.), **Malte Brun** (10,400ft.), and **Mt. Sefton** (10,300ft.). Further south are **Mt. Aspiring** (9,900ft.), and **Mt. Earnslaw** (9,100ft.).

(*b*) **Passes.** — These are relatively low points or saddles in the main range by which it is possible for traffic to **pass** from one side of the ridge to the other. They are not numerous in the Alps. Each is situated at the head or meeting point of two alpine valleys, one on each side of the main divide.

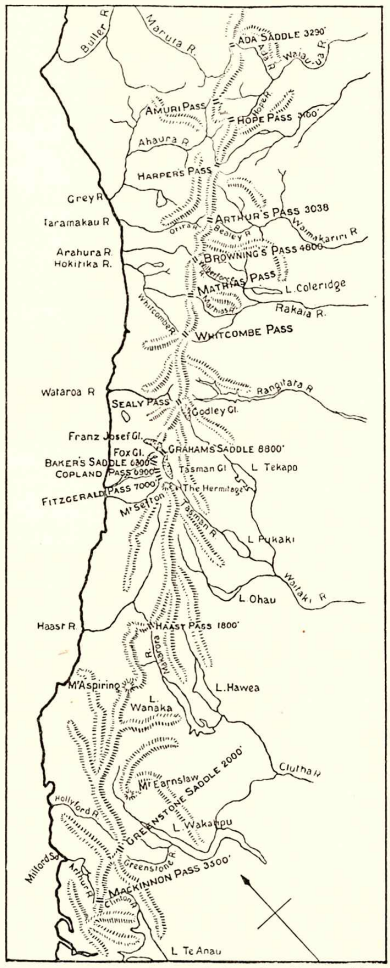
Pass.	Western Valley.	Eastern Valley.
Ada Saddle—in Nelson, a low pass (3,290 ft.), but very steep on the west. It was used by diggers in the early days.	A headwater stream of the Maruia, a tributary of the **Buller.**	The **Ada** River, a tributary of the Waiau-ua.
Amuri Pass (3,258 ft.)——in Nelson.	A headwater stream of the Ahaura, a tributary of the **Grey.**	A tributary of the **Waiau-ua.**
Hope Pass (3,100 ft.)—in Nelson.	Another headwater Stream of the Ahaura, a tributary of the **Grey.**	The **Hope** river, a tributary of the Waiau-ua.
Harper's Pass (3,148 ft.)—Situated at the meeting-point of the Nelson, Westland and Canterbury Provinces.	A headwater stream of the **Taramakau.**	The South branch of the **Hurunui.**
Arthur's Pass—(3,038 ft.) the only pass of importance. It is on the West Coast Road and near the site of the new Midland Railway tunnel.	The **Otira,** a tributary of the Taramakau.	The **Bealey,** a tributary of the Waimakariri.
Browning's Pass—(4,800 ft.) or Rakaia Pass.	The **Arahura.**	The **Wilberforce,** a tributary of the Rakaia.
Mathias Pass (4,700 ft.)	A tributary of the **Hokitika.**	The **Mathias,** a tributary of the Rakaia.
Whitcombe Pass (4,025 ft.)	The **Whitcombe,** a tributary of the Hokitika.	A headwater tributary of the **Rakaia.**

Pass.	Western Valley.	Eastern Valley.
Sealy Pass (5,800 ft.)	A headwater tributary of the **Wataroa.**	The **Godley Glacier** Valley which drains *via* Lake Tekapo into the Waitaki.
Graham's Saddle (8,759ft)	**Franz Josef** Glacier Valley	**Tasman** Glacier Valley.
Baker's Saddle (7,148ft.) **Copland Pass** (7,400 ft.) **Fitzgerald ,,** (6,863ft.) in the Moorhouse Range, a part of the Main Divide.	The **Copland** River.	The **Hooker** Valley, a glacier valley tributary to the Tasman River, which is itself a tributary of the Waitaki.
Haast Pass—(1,847 ft.) the lowest pass of all, and the most southerly of the Canterbury-Westland passes.	The **Haast** River.	The **Makarora** River which runs into the head of Lake Wanaka.
Greenstone Saddle.—(2,500 ft.)	The **Hollyford** River	The **Greenstone** River, running into the northwest of Lake Wakatipu.
Mackinnon Pass—(3,400 ft.), on the famous Milford Track.	The **Arthur** River, running into the head of Milford Sound.	The **Clinton** River, running into the head of Lake Te Anau.

(*c*) **Glaciers.** — In the valleys and on the summits of the Southern Alps are many glaciers, some of them of great size. On the Canterbury slope of Mt. Cook region the chief are: **Tasman** (18 miles long); **Murchison** (11 miles); **Hooker** (7¼ miles); and **Mueller** (8 miles). The Tasman glacier with an area of 22½ square miles is larger than any in the Swiss Alps. Its speed — 18 inches a day — is the highest of

the glaciers on the eastern slope. Its terminal face is about 2,500ft. above sea-level. On the Westland slope are the **Fox** and the **Franz Josef** glaciers, each from eight to ten miles long. The latter reaches to about 690ft. of sea-level and flows at the rate of about 2ft. a day. Glaciers also occur on the summits of Mt. Aspiring and Mt. Earnslaw.

(2.) **The Kaikouras.** — This southerly continuation of the North Island main divide consists of three parallel ranges running through Marlborough and the south-east of Nelson. The most westerly range is about 4,000 ft. in height. Between this range and the next, the **Inland Kaikouras** (9,000ft.), chief peak, Tapuaenuku (9460ft.), lies the valley of the Awatere River. East of this range is the valley of the Clarence River, between which and the coast lies the



Passes and Glaciers of the Southern Alps. Each pass lies between an eastern and a western alpine valley. Glaciers occur in lofty mountain valleys.

The snowline or limit of perpetual snow in the Southern Alps at Latitude 46° S. is about 7,800 ft.

Seaward Kaikouras (8,000ft). These ranges are extremely rugged, and their summits are razor-backed.

(3.) **The Mountains of the north and west of Nelson.** — This group consists of a central chain running parallel to the main divide and including the Paparoa Mountains, Lyell Mountains, and Pikiruna Mountains. At Mt. Arthur (5,800ft.) in the last range the Tasman Mountains branch off to the west. South of this range are the Marine Mountains. The Victoria Mountains branch off to the north-west from the Spenser Mountains and are continued in the Brunner Mountains. These ranges vary from 4,000ft. to 6,000ft. in height.

(4.) **The minor ranges of Canterbury.** — These are spurs and outliers of the Southern Alps. The Malvern Hills lie to the west of Christchurch. The Two Thumb Range (8,000ft.) leaves the main divide to the north of Mt. Cook, and stretches south through the Mackenzie Country to join the Hunter's Hills west of Timaru and Waimate. Further south is the Ben Ohau Range. Lying across the foot of the spurs of the main divide is a parallel ridge including Mt. Peel, Mt. Somers (5,500ft.), Mt. Potts, Mt. Hutt (7,000ft.), Mt. Torlesse (6,500ft.), and the Puketeraki Mountains.

(5.) **The Otago Ranges.** — Of these, the highest are in the north and west, and vary from 6,000 to 8,000ft. in height. In the north, naming from east to west, are the Kakanui Mountains, Hawkdun Mountains (6,000ft.), Dunstan Mountains, Richardson Mountains (7,000ft.), Humboldt Mountains; in the centre, Rock and Pillar Mountains, Hector Mountains, Eyre Mountains (7,000 ft.); in the south are the Hokonui Hills (2,000ft.), and the Takitimu Mountains (5,500ft.).

(6.) **Volcanic Remnants.** — There is but little sign of recent volcanic action in the South Island. Two projections on the east coast, namely, **Banks Peninsula*** and **Otago Peninsula**, are the worn-down remains of ancient volcanoes. In Banks Peninsula the highest peak

*See relief model in Canterbury Museum.

is Mt. Herbert (3,100ft.). A portion of Mt. Somers in Canterbury is ancient volcanic rock.

Stewart Island

Stewart Island is mountainous, the highest peak being Mt. Anglem (3,200ft.).

6.—PLAINS

Plains may be formed in several different ways. Sometimes the mountains in a district are worn down by river action and their valleys are joined up to form a level plain. Plains are also formed along the shore line where soft rocks are washed by the sea, and are easily worn down. Of these two classes New Zealand has only unimportant examples. The chief plains of New Zealand are of other types.

(1.) By far the most important are formed by the settling down or deposit of sediment and gravel brought down by the rivers. For this reason they are termed **alluvial*** or **fluviatile† plains**. The **Canterbury** and **Westland Plains** are of this type. The former commence at the foot of the hills less than half way across the island, and extend about 40 miles in width by 150 miles in length. Their highest elevation is about 1,500 ft., and they slope gradually to the sea. At Ashburton, fourteen miles from the sea, the elevation is 330ft.† The rivers that have formed this plain leave the mountains by steep narrow gorges. Their wide beds are covered with gravel, the smooth stones that compose it decreasing in size as the rivers near the sea. Plains of this type form the most valuable farming (and pastoral) land in the Dominion.

The **Westland Plain** on the steep western slope of the Southern Alps has an average width of 25 miles, and extends from the Grey River almost to the Haast. The numerous rivers are swift mountain torrents. The warmth of the region and the high rainfall have covered it with dense bush.

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*From Lat. *alluere*, to wash to or on; †*fluvius*, a river.
*See N.Z. Govt. Railways Time table.

Other gravel plains are the **Southland Plains**, the **Waimea Plains**, the **Taieri Plains**, the Maniototo, the Ida Valley, and the Manuherikia Valley, of Otago and Southland; the Mackenzie and Waimate Plains of South Canterbury; and the Waimea, Motueka, and Wairau Plains of Nelson and Marlborough.

In the North Island similar plains occur at the mouths of the **Manawatu** and **Waikato** rivers, in the **Thames** and **Piako Valleys** (the Hauraki Plains), and in the depression to the east of the main divide, including the **Wairarapa Plain** (Ruamahanga Plain), and the **Hawke's Bay Plain**, including the Ruataniwha and Heretaunga Plains. The **Poverty Bay Plain** is a rich alluvial plain 65 square miles in area. Of similar formation, but of different material, is the **Middle Waikato Plain**, lying in the middle course of the Waikato river to the west of the volcanic plateau. It is composed of pumice sediment washed down by the Waikato from the volcanic highlands of Lake Taupo district.

(2.) The **Wanganui Plain**, extending from Mt. Ruapehu on the north-east to Mt. Egmont and Wanganui on the west, is an example of another type of plain—one formed by deposit beneath the sea and afterwards raised. It is a large coastal plain sloping from an elevation of 2,000ft. to sea-level and much cut up by river valleys. Dense bush still clothes the less accessible portions of it. The portion lying to the north and west of Hawera is called the **Waimate Plain.**

(3.) The third type of plain is shown in the **volcanic plateau** extending to the north and west of Lake Taupo. The eastern portion, called the **Kaingaroa Plains**, consists of very poor pasture lands. The whole district — of an average elevation of over 1,000ft. — is composed of pumice or papa rock, and a large portion of it is too porous to grow more than a thin covering of fern and scrub.

The **Waimarino Plain**, through which the Main Trunk Railway passes, lies between the central volcanic range

and the Upper Wanganui River. Its surface is composed of tussock-covered pumice sands and clays, and it lies at an average height of over 2,000ft. above the sea. To the south of it is the magnificent Waimarino Forest.

To the east of Ruapehu lie two desert areas. These are the **Rangipo Desert** and the **Onetapu Desert** (or Desert of the Sacred Sand). At the western foot of the same volcanic range lie hummocky ridges from 50ft. to 250ft. high, forming the western fringe of the Waimarino Plain. These ridges are due to moraines left by the numerous glaciers that once flowed down the western slopes of the volcanoes.

The **Muritoto Plain** is another elevated plain composed of porous volcanic materials that produce a coarse native grass suitable for grazing. It lies to the south of Mt. Ruapehu.

Swamps.—Land which is near or below sea-level collects water and silt and forms a swamp. In New Zealand swamps mostly occur in low-lying portions of river courses and where the rainfall is high. As their soil consists of river deposit and vegetable mould, when drained they yield very rich farm land. The Awaroa Swamp, between Waiuku and the Waikato, and the Ngaire Swamp (3,700 acres), near Eltham, are now drained and under cultivation. Several large areas of swamp are being reclaimed in the North Island by the Government. The chief are the Hikurangi Swamp (23,000 acres), about 15 miles north of Whangarei, the Piako Swamp (90,000 acres) (Hauraki Plains), the Rangitaiki Swamp (87,000 acres) near the Bay of Plenty, and the Makurerua Swamp (15,000 acres), a raupo and flax swamp, between Tokomaru and the Manawatu River. Napier South stands on the site of a swamp reclaimed in the seventies. The swamps of the South Island are of smaller extent, and more easily drained by farmers at their own expense. For example, the rich Longbeach Estate, in Canterbury, to the south of the Ashburton River mouth, was once a large swamp, as was the district between Ohoka and Rangiora, and much of the sites of Christchurch and Dunedin. Some low-lying country in river valleys subject to flood gives settlers much trouble. An extensive swamp lying beside the Picton-Blenheim road cannot be drained as it is below sea level. (See also pp. 55 and 62.)

7.—RIVERS*

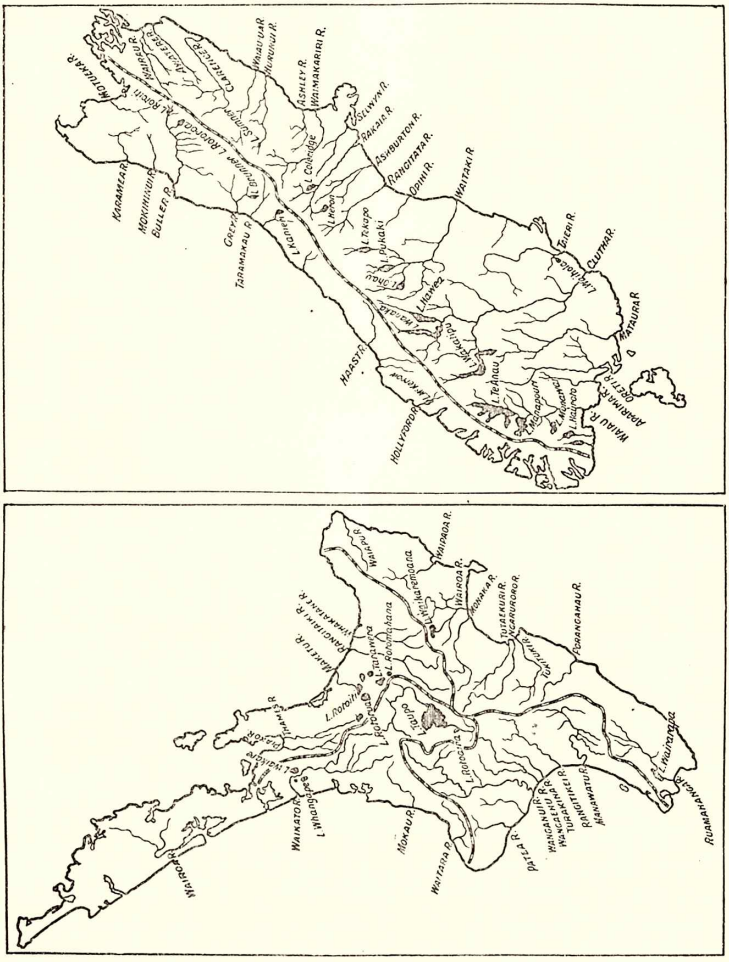
North Island

All the rivers draining one slope of a country form a river system. With one main divide in the North Island we should expect to have only two river systems, an eastern and a western. The existence, however, of the volcanic range, which is higher than the main divide, makes a double watershed, so that instead of two there are four important river systems in the North Island. These may be conveniently named (1) the east Auckland or Bay of Plenty system; (2) the west Auckland system; (3) the eastern system; and (4) the south-western system.

(1.) **The East Auckland System.**—In the north Auckland peninsula the divide is too near the east coast to leave room for any rivers of importance. The **Piako** and the **Thames** rise in the volcanic plateau and flow over low, nearly level, and even swampy country into the Firth of Thames. Two small streams, the Tarawera and the Kaituna drain the lakes of the thermal district into the Bay of Plenty. Four other important rivers flow north into the Bay of Plenty: the Rangitaiki, Whakatane, Waioeka, and Motu. The **Rangitaiki** rises in the Kaimanawa Range and flows through the Kaingaroa Plains. The **Whakatane** drains the north-western slope of the Huiarau Range.

(2.) **The West Auckland System.**—All the rivers of this system flow into tidal estuaries that are partly blocked up by sand carried along by the high seas and strong northern currents on the coast. The **Wairoa**† river rises in the ridge to the south of the Bay of Islands, and takes a southerly course into Kaipara Harbour. It is navigable for 90 miles from the mouth of the estuary. The **Waikato** with a length of 270 miles is the longest river in the Dominion. It rises on the north-east of Mt. Ruapehu, enters the south of Lake Taupo, and passes out at the north-east. Near its exit from the lake are the Huka Falls (30ft.), and

*For the uses of rivers see p. 59.
†Usually distinguished as the Wairoa North.


Motueka R.
Karamea R.
Buller R.
Grey R.
Taramakau R.
Arahura R.
Hokitika R.
Waitaha R.
Mikonui R.
Waiho R.
Whataroa R.
Poerua R.
Okuru R.
Haast R.
Makarora R.
Hunter R.
Dart R.
Rees R.
Matukituki R.
Wanaka R.
Clutha R.
Waitaki R.
Opihi R.
Rangitata R.
Ashburton R.
Rakaia R.
Waimakariri R.
Ashley R.
Hurunui R.
Waiau R.
Clarence R.
Wairau R.
Awatere R.
Conway R.
Waiau R.
Hapuku R.
Kowhai R.
Waipara R.
Ashley R.
Rangitata R.
Rakaia R.
Waimakariri R.
Selwyn R.
Kaituna R.
Avon R.
Heathcote R.
Waitaki R.
Clutha R.
Mataura R.
Oreti R.
Aparima R.
Waiau R.
Whanganui R.
Rangitikei R.
Manawatu R.
Hutt R.
Ruamahanga R.
Waikato R.
Mokau R.
Waitara R.
Patea R.
Whanganui R.
Rangitikei R.
Manawatu R.
Hutt R.
Ruamahanga R.
Tongariro R.
Waikato R.
Waipa R.
Mangapiko R.
Mangaonua R.
Waitara R.
Mokau R.
Awakino R.
Tongaporutu R.
Whanganui R.
Waitotara R.
Patea R.
Waingongoro R.
Hangatahua R.
Manganui o te Ao R.
Whenuakura R.
Waimate R.
Kaihihi R.
Waitara R.
Waiwhakaiho R.
Mangaoraka R.
Waiongana R.
Waiau R.
Whakatane R.
Rangitaiki R.
Tarawera R.
Kaituna R.
Waihou R.
Ohinemuri R.
Waitakaruru R.
Piako R.
Waihou R.
Waitoa R.
Waihou

the Aratiatia Rapids. The river takes a general north-westerly course through the volcanic plateau and the Lower Waikato Plain, makes a turn to the west, and enters the Tasman Sea. At two points in its course it passes through deep gorges which it has cut in the volcanic hills. Its chief tributary, the **Waipa**, rises near the source of the Ongaruhe, and flowing north enters through the left bank at Ngaruawahia. The Waikato is navigable by small steamers for 75 miles. The **Mokau**, which forms the northern boundary of Taranaki, and the **Waitara** flow westward into the North Taranaki Bight.

(3.) **The Eastern System.**—The **Waiapu River** rises in the Raukumara Range and enters the sea a few miles south of East Cape. The Waipaoa flows south-east from the same range into Poverty Bay.

Five Hawke's Bay rivers flow into Hawke Bay. They are the Wairoa, Mohaka, Tutaekuri, Ngaruroro, and Tukituki. The Wairoa rises in the Huiarau Mountains, and flows through Waikaremoana. The **Mohaka** has its source in the north-east slopes of the Kaimanawa and Ahimanawa Ranges. The **Ngaruroro** draws its waters from the Kaimanawa and Kaweka Ranges. The **Tukituki** rises in the Ruahine Range. Other rivers of the eastern slope are Porangahau, Pahaoa flowing east, and Ruamahanga flowing south-west through the Wairarapa Valley and Lake Wairarapa, and carrying the drainage of the two opposite slopes of the Tararua and Maungaraki Ranges into Palliser Bay.

(4.) **The South-western System.** — This includes all the drainage into the northern enlargement of Cook Strait. A number of small unimportant streams have their source in Mt. Egmont.

The **Wanganui** drains the western slope of Mts. Tongariro, Ruapehu, and the Volcanic Plateau. An important tributary, the **Ongaruhe**, rises in the Rangitoto Range. Unlike the Canterbury rivers that flow through gravel plains of their own making, it flows swiftly through a defile, a deep narrow channel which it has slowly cut through the soft rocks of the

Wanganui Plain. Bush clad cliff faces and hillsides rise on either hand. The stream is navigable by steamers of light draught for 120 miles.

The **Wangaehu** and **Rangitikei** drain the central portion of the main divide in the north of Wellington.

The **Manawatu River** rises in the Puketoi Range, drains the Ruahine and Tararua Ranges and, passing through a deep gorge between the latter ranges, traverses a gravel plain and discharges into the northern extension of Cook Strait.

South Island

As we have seen, the South Island has one great watershed following the direction of the coast-line. There are thus in reality only two river systems, an east and a west. The nearness of the main divide to the west coast in Westland and Otago makes the rivers south of the Grey short and torrential, and hence of little importance. The simplicity of the river systems is, however, modified by the two depressions of Cook and Foveaux Straits, which deflect a few of the rivers northward and southward respectively. The rivers of the South Island then may be grouped in four systems: — (1) the northern or Cook Strait system; (2) the eastern system; (3) the southern or Foveaux Strait system; (4) the western system.

(1.) **The Northern or Cook Strait System.** — The **Awatere** flows north-east from the Inland Kaikouras into Cook Strait.

The **Wairau** rises in the St. Arnaud Mountains near Mt. Franklin and flows north-east through a gravel plain of its own formation into Cloudy Bay.

Other northern streams are the **Pelorus**, running into Pelorus Sound, the Motueka flowing into Tasman Bay, and the Takaka and Aorere emptying into Golden Bay.

(2.) **The Eastern System.**—The **Clarence** rises in the Spenser Mountains and flows south and then north-east between the Inland and Seaward Kaikouras. After making a sharp curve round the north of the latter range

it enters the South Pacific Ocean. Its chief tributary is the Acheron.

The **Waiau-ua** (commonly called the Waiau) rises in the southern portion of the Spenser Mountains, and flows east through the Amuri Plains and a deep gorge in the Seaward Kaikouras into the Pacific Ocean.

The **Hurunui** rises in the Southern Alps and flows east through Lake Sumner into the Pacific Ocean. It was the old provincial boundary between Nelson and Canterbury.

All the Canterbury rivers, including the **Hurunui**, **Ashley**, **Waimakariri**, **Selwyn**, **Rakaia**, **Ashburton**, **Rangitata**, and **Waitaki**, have the same characters. They rise in the main ridge or on the spurs and foothills of the Southern Alps, and flow through steep narrow gorges and across gravel plains of their own making. The **Ashley** and the **Selwyn** rise in the Puketeraki Mountains and Malvern Hills respectively, and so are shorter than the others. The latter empties itself into Lake Ellesmere. The **Waimakariri** rises near Arthur's Pass. Its important tributaries are the Bealey and the Kowai. The Ashley and the Waimakariri flow into Pegasus Bay. The other rivers flow into the Canterbury Bight. In the basin of the Rakaia are Lakes Coleridge and Heron. Smaller rivers of South Canterbury are the Hinds, the Orari, and the Opihi.

The **Waitaki River** which forms part of the boundary between Canterbury and Otago, is a rapid river which carries off the drainage from the Mt. Cook eastern system of glaciers. In its upper course are the alpine lakes Tekapo, Pukaki, and Ohau. The largest of the tributary streams is the Tasman River, which drains the Tasman Glacier into Lake Pukaki. The Waitaki is the third largest river in the Dominion.

The **Kakanui** and **Shag** are smaller rivers, rising on either slope of the Kakanui Mountains. They flow in a south-easterly direction into the Pacific.

The **Taieri**, from the highlands surrounding the Maniototo Plain, flows first in a northerly and then in a

southerly direction into the Pacific. During its course it flows through Lake Waihola. In its upper waters the Taieri is a gold-bearing river.

The **Clutha**, from the snow-clad ranges around Lakes Hawea, Wanaka, and Wakatipu, flows in a southerly direction into the Pacific, a little to the north of Nugget Point. Its chief tributaries are the Kawarau (with its affluent the Shotover), the Manuherikia, and the Pomahaka. The Clutha drains an area of 8,250 square miles, and discharges more water into the sea than any other New Zealand river. The large lakes, Hawea, Wanaka, and Wakatipu, with an area of 237 square miles, first receive the drainage of the extensive snow-covered region surrounding them, so that owing to the waters having to spread over such a large area before entering the main channel, floods on this river are very rare. The Clutha is a very rapid river; but in spite of this it is navigable by small steamers for 40 miles from its mouth. Here and there along its course dredges are engaged in obtaining gold.*

(3) **The Southern or Foveaux Strait System.**—The **Mataura**, from the Eyre Mountains, flows south through the Southland gravel plain into Toetoes Bay. The Mataura drains an extensive area in the centre and south of Otago. Where a small waterfall occurs the township of Mataura has sprung up.

The Oreti and the Aparima, or Jacob's River, are smaller rivers flowing south into Foveaux Strait.

The **Waiau**, from Lake Te Anau, flows through Lake Manapouri and then south into Tewaewae Bay. The Waiau drains an area exceeding 3,000 square miles of country.

(4.) **The Western System.**—The streams of west Otago are torrents flowing directly into the sea. Those of Westland are rarely more than 45 miles in length. They rise in steep alpine valleys and flow swiftly through forest-clad gravel plains to the sea. The mouths of some of them are diverted by long spits of shingle.

*See page 91.

As they receive their waters direct from alpine glaciers, they are subject to sudden and destructive floods. Gold dust is found in the beds of many of them.

The Haast, the Hokitika, the **Taramakau**, and the **Grey** flow into the Westland Bight. The Haast takes its course through a long valley. The Hokitika carries off the drainage from Lakes Kanieri and Mahinapua. The mouth of the Taramakau is blocked with banks of sand. The Grey rises in the Victoria Mountains and the Paparoa Range. Its largest tributary, the Arnold River, drains Lake Brunner.

The **Buller** and **Karamea** rivers flow west into Karamea Bight. The former rises in the Spenser and St. Arnaud Ranges, and receives many tributaries on both banks. The largest is the Inangahua, which flows north and enters on the left bank. In the upper basin of the Buller are Lakes Rotorua and Rotoiti. The Buller flows through two gorges: the **Upper** which separates the Brunner Range on the south from the Lyell Range in the north, and the **Lower** between the northern end of the Paparoa Range on the south, and Mt. Rochfort and Mt. William on the north. It enters the sea at Westport. There is good reason to believe that the Buller at one time flowed into Tasman Bay.

A striking feature in the river scenery of New Zealand is the frequent occurrence of terraces, rising one above the other on their banks like flights of stairs. The steps become less and less plain as they ascend until they merge into the hillsides or lead on to wide plains at a high level. These terraces show the different levels at which the waters have flowed at different times, and were formed by rivers cutting down their beds and moving about across the floor of the valleys in which they flowed.

8.—LAKES

Lakes are inland bodies of water filling hollows or depressions in the ground. They may be fresh or salt, hot or cold. New Zealand is well supplied with lakes, and has one or more examples of nearly every variety

of lake. The largest is **Lake Taupo**, which covers 238 square miles, is 530ft. deep, and whose floor lies over 650ft. above sea-level. **Waikaremoana,** which lies 2,000ft. above sea-level, has no direct outlet, the water escaping through the lake margin and emerging again 400ft. below the lake level.*

Lake Wakatipu has an area of 112 square miles, its surface is 1,059ft. above and its floor 180ft. below sea-level. The cold lakes in the Waikato and Clutha basins act as storage reservoirs and lessen the danger of floods in those rivers.

The lakes of New Zealand may be grouped according to their mode of formation as follows:—

1. Lakes more or less brackish, formed on the coast by shingle drifted by tides and currents across river mouths. **Lake Ellesmere** in Canterbury, **Lake Wairarapa** in Wellington, and the coastal lagoons of Westland, *e.g.*, at Okarito, have been formed in this way.

2. Lakes formed by stoppages in the beds of rivers. These stoppages are caused in different ways:—

(*a*) by drifting sand. Sandhills carried by wind have produced the tiny Lakes Virginia and Westmere near Wanganui.

(*b*) by streams of lava. The blocking of valleys by lava from an ancient volcano has produced Lake Rotoaira near Mt. Tongariro.

(*c*) by glacial moraines. Rocks and boulders once carried down by glaciers have collected and so partly blocked the valley-outlet. Examples are **Lake Coleridge**, **Lake Pukaki**, and **Lake Tekapo.**

(*d*) by landslips. A fall of earth from the steep mountain sides has caused the formation of **Lake Ada** near Milford Sound.

3. Lakes formed in volcanic craters. If the rainfall on a volcanic peak is considerable, the crater depression becomes a lake. Examples are Lake Takapuna on the North Shore six miles from Auckland, and Mt. Ruapehu

*Utilised for generating electricity. See pages 139 and 167.

crater lake, which is filled with water that is at one time boiling, and at another covered with ice.

4. Lakes formed by sinking of the land as a result of volcanic eruptions. In this way **Lake Taupo**, New Zealand's largest sheet of fresh water, **Lake Rotorua**, and **Lake Rotomahana** were formed.

5. Lakes formed by the action of glaciers. The beds of many of the Otago cold water lakes have been gouged out by glaciers in the distant past. Such are **Lakes Wakatipu, Manapouri, Te Anau, Monowai,** etc.

9.—THERMAL DISTRICTS

The main **Thermal District** extends through the North Island in a strip some twenty miles broad by 150 miles long, beginning at Mt. Ruapehu in the south and passing through Ngauruhoe, Tokaanu, the Geyser Valley north-east of Lake Taupo, Rotorua, etc., and ending in the hollow burning crater of White Island, 27 miles out in the Bay of Plenty. It should be noted that, of the larger lakes in the district, Rotorua, Rotoiti, and Tarawera are cold. The greater part of Rotomahana also is cold, but its northern and western portions are very hot and even boiling. (See page 30). The phenomena of this district may be grouped into six classes:—

(1) geysers; (2) boiling pools; (3) hot springs; (4) blowholes of steam and sulphur vapour; (5) displays of coloured earths; (6) pools of boiling clay and mud.

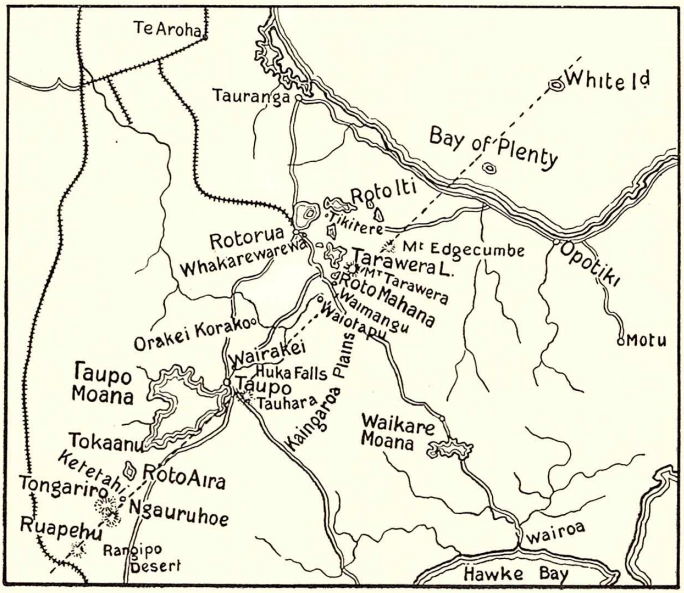
(1) A **Geyser** is a hot spring, which at intervals, throws a column of water or mud high into the air. Some are active only for a short time, others remain active for years. Examples:— **Wairoa** and **Pohutu**, near Rotorua; the **Crow's Nest** at Taupo on the bank of the Waikato River; the **Great Wairakei**, near the **Dragon's Mouth** in the Geyser Valley; **Waimangu**, near Lake Rotomahana (active from 1901-1905, and again in 1917).

(2) **Boiling Pools** occur where the underground steam has not enough force to cause an explosion. These are found of many sizes and colours in all parts of the District. Examples:— The **Witch's Cauldron** (12 feet across) near the Crow's Nest at Taupo; the **Murder-Pot** (5 feet across) of a rich sapphire blue,

at Whakarewarewa, near Rotorua; the **Champagne Pool** of Waiotapu; the **Champagne Cauldron** (deep blue) at Wairakei (50 or 60 feet across); **Waiora Pools** at Wairakei (green and blue).

(3) **Hot Springs** occur in great numbers at **Rotorua, Whakarewarewa, Orakei Korako, Taupo, Tokaanu,** and many other places.

(4) **Blow-Holes** or fountains of (*a*) steam or (*b*) sulphur vapour occur as follows:—(*a*) Steam: the **Devil's Blowhole** at



The Thermal Springs District. The dotted line indicates the "fault."

Waimangu near Rotomahana; **Kerapiti** at Wairakei, a continuous great jet of steam pouring out of a narrow slit fringed with manuka. (*b*) Sulphur vapour: common near Rotorua; also on **White Island.**

(5) Displays of **Coloured Earth.** These consist of tracts of earth burnt by volcanic fire and coloured with minerals. They are quite gaudy in colouring, showing many shades of red, yellow, orange, primrose, etc. Examples:—**Champagne Terrace** and the rose-red cliff at Wairakei; **Gibraltar Rock,** near Waimangu, primrose to pale pink.

(6) Pools of **Boiling Clay** or **Mud** (called **porridge-pots**), and **mud-craters** or **mud-volcanoes.**

(*a*) Porridge-pots are simply holes in the earth filled with a working slime like boiling oatmeal. They are cream-coloured or sometimes cream with a touch of red, and vary in size, the smallest being less than an inch across. Many examples are to be seen at **Taupo.**

(*b*) Mud-craters are larger. The bubbles rising to the surface of the fluid give off an offensive smell in bursting, and the spattering of mud from them slowly builds up the surrounding crater. The **Inferno, Tikitere,** near Rotorua, is a maze of such mud-pools.

In addition to the great thermal region described above there are a number of smaller thermal districts in the Dominion. Most of them are in the Auckland province. North of Auckland the most important are the Waiwera, Kamo, and Ohaeawai Springs.* To the north-west of Rotorua are the rival springs and spa of Te Aroha and others less famous, while in the East Cape and Poverty Bay districts several more occur. In the South Island the chief thermal region is in the Hanmer Plains. Most of the districts mentioned above furnish medicinal waters, which are bottled and sold though perhaps the most widely known are the Wairongoa mineral waters obtained near Mosgiel, in Otago.

10.—CLIMATE

Climate is the average weather enjoyed by a country from year to year. As explained in the General Survey on page 21 the climate of the North Island is classed as **warm temperate**, that of the South Island as **cool temperate.** Every part of the country is perfectly healthy. The air is warmer and drier than in Great Britain; indeed, the climate is more akin to that of Italy than to that of the Motherland. Bright sunshine is abundant, not only in summer, but in winter, averaging between five and six hours a day throughout the year. On account of its lofty chains of mountains, and its insular position, plenty of rain falls during the year. In the far north the winters are very mild, frost and snow being unknown except on the higher levels. Further south the summers are not so warm, and the winters are colder. Frosts occur even on the lowlands of the South Island during the winter months. Snowstorms occur,

*See p. 166.

though not often, even in the extreme south, but snow seldom lies more than a few hours except on the uplands and hill-tops.

The **Seasons** in New Zealand may be roughly divided as follows:—

Summer: December, January, February.
Autumn: March, April, May.
Winter: June, July, August.
Spring: September, October, November.

The conditions controlling climate may be discussed under the heads (*a*) temperature, (*b*) winds, (*c*) rainfall.

(*a*) **Temperature** is governed by latitude or distance from the equator, altitude or height above the sea, nearness to the sea, and the slope of the land. New Zealand extends from latitude 34·5° S. to 47° S., and thus covers 13° of latitude or nearly 1,000 miles. The temperature naturally varies considerably from the extreme north to the extreme south. The great elevation of the land, particularly in the South Island, tends very much to lower the temperature, but the nearness of the sea to all parts of the land makes it cooler in summer and warmer in winter than it would otherwise be. No part of New Zealand is more than seventy-five miles from the sea; this prevents great extremes of heat and cold, a climatic advantage which islands possess over the interior of continents. The greatest extremes of temperature occur in the Central Otago highlands. Though the nearness of the sea serves to temper the New Zealand climate, cold currents flowing up from the south on the east coast, and warm currents flowing across the Tasman Sea on the west, cause the east coast to be colder than the west. The cold Antarctic current passes in a north-easterly direction up the east coast of the South Island and then joins the cold westerly drift across the South Pacific, while the warm New South Wales current circles round the Tasman Sea and passes north up the west coast of both islands. (See map page 11). The mean annual temperature of the North Island is 56° F.; and

that of the South Island is 52° F. The latter is about 1° warmer than the average for London and New York.

Land on a slope facing the sun — which lies to the north in the southern hemisphere — is naturally warmer than that sloping away from it. Thus the warmth of Nelson and New Plymouth is partly due to their northerly aspect.

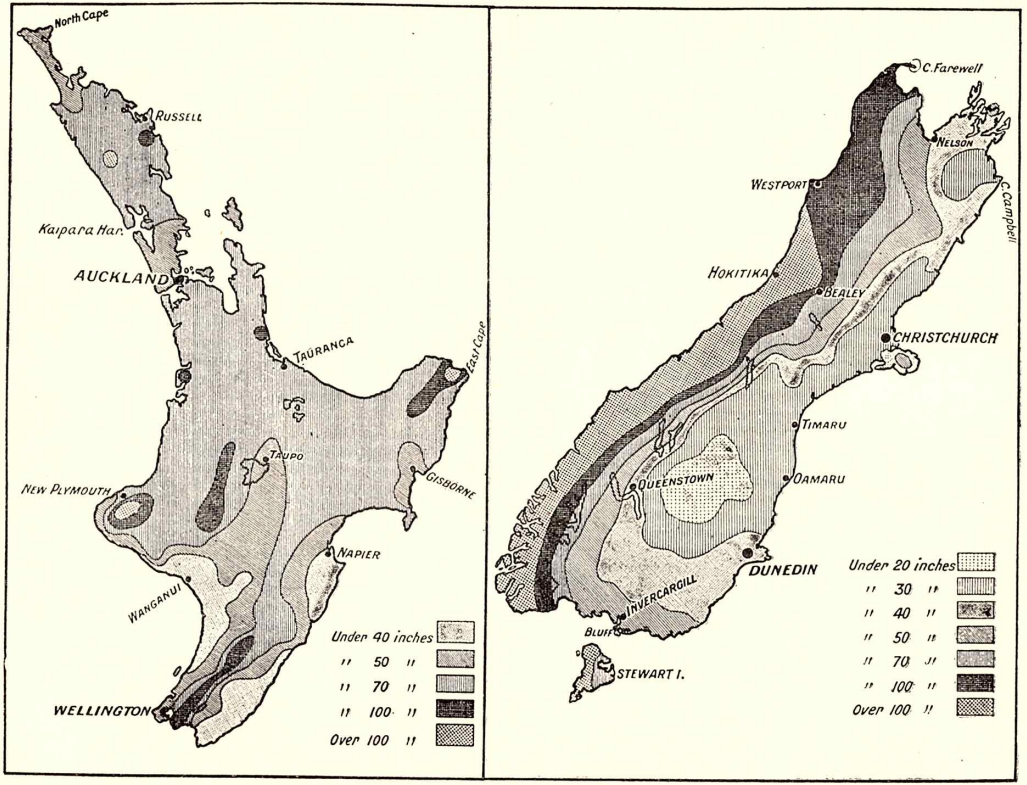
Temperature decreases 1° F. for every 300ft. of height, and about the same amount for each degree of latitude (approx. 70 miles) southwards.

(*b*) The **winds** of New Zealand may be grouped as follows:—

(1) Westerlies; (2) easterlies; (3) local winds. New Zealand lies in the path of the "brave westerly winds" of the mighty Southern Ocean. These are the "roaring forties," the north-west anti-trade winds that were formerly made great use of by vessels sailing Home *viâ* Cape Horn. These are moderately warm moisture-laden winds blowing off the Tasman Sea. On reaching the Southern Alps the wind ascends the mountains, giving up its moisture in the form of rain. When vapour turns to water, heat is given off to the air, and thus the wind descends to the eastern plain dry and warm. It is further warmed by compression in its descent. Such is the **nor'-wester** that often blows with violence in summer and less violently in winter across the Canterbury Plains. At harvest time it is sometimes destructive to standing crops.

The **sou'wester**, or southerly buster, is a strong wind which travels in a circular path over the Dominion and neighbouring seas. It is often accompanied by rain, especially in the south. It is more common in winter and spring than in summer, and is often destructive to shipping, to growing crops, and sometimes to young stock and newly shorn sheep.

The **easterly** winds, both north-east and south-east, are felt chiefly to the east of the main divides of both islands. They are cool, moist, steady sea-breezes, most common in spring and autumn. At times they bring



Map of Mean Annual Rainfall of New Zealand. *(By permission of the Minister of Marine)*

rain which, in the South Island, is usually misty and continuous rather than heavy and violent. In the North, however, the north-easter is the chief rain-bearing wind. In summer, in the north of Auckland peninsula, this wind develops into the easterly trade-wind that often blows for weeks together.

Local winds of some importance are **land and sea breezes** of sheltered spots such as Nelson and Kawhia that are hemmed in by mountains.

(*c*) **Rainfall.**—The sun is the first cause of rain, as it is of wind, for it brings about evaporation. The water-vapour thus produced is carried by wind, and turns to cloud, rain, snow, or hail when forced by mountains to ascend to colder levels of air. New Zealand enjoys an ample rainfall well spread throughout the year, and more rain falls at night than during the day. In the North Island the rainfall is greater during the winter months, but in the South Island the average does not vary greatly from month to month. The North Island has an average annual rainfall of 52 inches. The highest occurs on the summits of the ranges, where it averages from 70 to 100 inches. The lowest rainfall area is in Hawke's Bay, where the lowland* occasionally suffers from long periods of dry weather. This is due to the fact that the westerly winds deposit their moisture upon the western ranges and reach the plain dry and warm. At Mt. Egmont the rainfall is 112 inches. The averages over a long period of years are nearly 42 inches at Auckland, 51 at Wellington, 38 at Wanganui, and 47 at Gisborne.

In the South Island, though the extremes are greater, the average rainfall is only 46 inches. On the west side the fall is almost everywhere over 100 inches, and gradually increases further south to 220 inches. The driest districts are the Wairau Plain and an easterly strip stretching through the Canterbury, Waimate, and Taieri Plains to the mid-Clutha basin. The latter has

*From Takapau in the south to near Hastings. Coastal ranges here are low, and easterly winds bring no rain when once a long spell of westerlies has made the plain dry and hot.

the lowest average, 14 inches per annum. The averages over a long period of years are 59 at Nelson, 25 at Christchurch, 115 at Hokitika, 195 at Otira, 38 at Dunedin, and 45 at Invercargill.

Though the relation between forests and rainfall is not yet understood, experts assert that were the whole of the trees of New Zealand removed, the rainfall, owing to the moist sea-winds and the mountain ranges favouring precipitation, would not be affected in the slightest degree.

11.—PLANT AND ANIMAL LIFE

As we have seen (page 17), New Zealand is only the remnant of a land that was once of continental size. Nothing proves this so clearly as the relationship of her plants and animals with those of Antarctica, Australia, New Guinea, and South America. Still, about three-quarters of her plant life and over three-quarters of her animal life are found nowhere else. Plants and animals change as the ages go by, and the separation of New Zealand from other lands caused her plants and animals to become more and more unlike those of the lands from which their ancestors came.

I.—Native Plants and Animals

A. **Plants.**—These include forest trees, shrubs, flowers, and pasture grasses. The best timber trees (See page 77) are kauri (found only in Auckland) white pine, red pine, black pine, totara, black* and brown† beeches (commonly called birches), tawa, and puriri. Tree ferns and cabbage trees are common everywhere. The nikau palm is found at least as far south as Akaroa on the east and Greymouth on the west. The plants last named, together with the various climbers (clematis and supplejack) remind one of tropical lands. Of flowering trees the various kinds of rata, including the Christmas Tree or pohutukawa, the hinau, the kowhai, and the ribbonwood, are of great beauty. Some of the commonest flowering shrubs are the numerous veronicas, manuka (tea-trees), the fuchsias, the senecios, and the olearias.

Nothofagus solandri. †*Nothofagus fusca.*

Among smaller plants the mountain buttercup, usually called the mountain lily, and the mountain daisies and gentians, are of special charm. New Zealand flax or *phormium*, of which there are two species including some fifty varieties, yields a strong fibre used for making rope and twine. In swamp country the plants that flourish best are toe-toe, nigger-heads, cutty grass, raupo, and rushes, besides flax and cabbage trees. New Zealand grasses consist of different kinds of tussock grass such as poas, danthonias, and festucas.

B. **Animals**.—These include reptiles, birds, fish, and insects.*

New Zealand is poor in native animals. Besides the four classes named above, the only animals found on the islands by the earliest settlers were a dog, a brown rat, two bats, and a frog. The first two were brought over by the Maoris, and the bats no doubt came from Australia.

(1) The few New Zealand **Reptiles** are small and harmless; they include some fifteen kinds of lizards, of which the tuatara (18 in. long) is the most remarkable.

(2) The **Birds**, however, are most interesting. Most are songless and dull of plumage, while many are flightless. The absence of bird-enemies, the abundance of food, and the long separation from the outside world, combined to produce a large number of flightless birds. Besides the extinct moa and notornis† we still have the weka or wood hen, the kiwi, and the kakapo, all ground-loving birds. The four last-named are also night birds. Another ground-bird, the quail, was weak of flight, and is now probably extinct. New Zealand parrots include two parakeets, the kakapo (or ground parrot), the kaka, a noisy forest bird, and the kea (or mountain parrot), some of whom have learned to attack sheep for the sake of their kidney-fat. These islands are visited by several birds of passage, including the godwit, the sandpiper, the knot, the spotted plover, and the two cuckoos (shining

*See *Animals of New Zealand*, by Hutton and Drummond. 4th Ed.
†A large flightless swamp bird of south-west Otago.

or bronze cuckoo and the long-tailed cuckoo). Of birds of prey we have two kinds of hawk and two kinds of owl. Coast and sea-birds include a great variety of gulls, gannet, shags, penguins, albatrosses, and petrels. The chief river and lake birds are shags, teal, ducks (grey, blue, and paradise), pukekos (swamp-hens), and bitterns. The beautiful white heron, which also occurs in Europe, is now very rare in New Zealand.

Though most of our birds are almost songless, the bell-bird and the tui are notable exceptions to the rule. Other forest birds are the two tits, the two robins, the two crows, as well as the white-eye, the wrens, the fantails, the saddleback, the huia, and the pigeon. The defenceless native birds have disappeared rapidly before grass and bush fires, the felling of the native bush, reckless shooting, and the introduction of foreign birds and bird-enemies such as rats, cats, ferrets, stoats, weasels, and opossums. For this reason the New Zealand Government has set apart large tracts of bush land known as reserves or national parks (*e.g.*, Egmont, Tongariro, Otago Sounds, Bealey, Tasman, and Stewart Island), as well as three sanctuaries—Little Barrier Island (Auckland), Kapiti Island (Wellington), and Resolution Island (Otago)—where native birds and plants may live undisturbed, and so be preserved from the extinction that once threatened them.

(3) **Fish** have always been plentiful in New Zealand rivers and seas. About thirty-five kinds are used for food. The chief food-fishes are the eels, herring (mullet), white-bait, crayfish, flounder, sole, brill, blue and red cod, schnapper, kahawai, tarakihi, trumpeter, ling, trevalli, hapuku (groper), frost fish, butterfish, moki, warehou, barracouta, and oysters. Sea animals, such as whales, the fur-seal, the sea-lion, and the sea-leopard, were once more common in New Zealand waters than they are to-day. Whales* are still hunted off the New Zealand coasts by well-equipped and up-to-date whalers.†

*Chiefly of the hump-backed variety.

†Stations are located at Whangamumu (N. Auckland), at Kaikoura, and Tory Channel (Marlborough).

(4) The native **Insects** of New Zealand include a few butterflies (the red admiral and the copper butterfly), numerous moths, many flies (including the stinging mosquitoes and sand-flies, blow-flies or blue-bottles), bees, ants, the cicadas or locusts, grass-hoppers, walking-stick insects, vegetable caterpillars, and dragon flies. The only creature with a poisonous bite is the katipo spider.

New Zealand has done little towards enriching mankind with either plant or animal. Her timber trees are slow growing and unfit for rearing elsewhere; her flax (*Phormium*) and the vegetable, New Zealand spinach (*Tetragonia*) are the only plants cultivated abroad. Of her animal life not a single kind is of commercial value to man elsewhere.

II.—Introduced Plants and Animals

The introduced plants and animals are the greatest source of wealth to New Zealand people. Without the imported live stock, and farm and garden plants, the country would support only a very small white population. When once the native forest is worked out, flax will remain the only purely native-plant industry in the land.

A. **Plants.** — The plants of temperate regions all over the world grow readily in New Zealand. The chief importations are flowering plants and shrubs, fruit trees, Australian and European forest trees (including gums, wattles, willows, poplars, larch, spruce, pines, sycamore, birch, elm, ash, oak, and chestnut); cereals (wheat, oats, barley, rye, maize*); flax (*Linum*), farm and garden vegetables; English grasses, clovers, and lucerne.

B. **Animals.** — These have been introduced (*a*) as enemies of pests; (*b*) to provide game; or (*c*) as domestic animals to supply labour, food, and articles of trade; (*d*) accidentally; or (*e*) for sentimental reasons.

*Warm temperate and sub-tropical.

1. **Birds.** — Ostrich; poultry (pigeons, fowls, ducks, geese, turkeys); pheasants, Californian quail; sparrows, finches, sky-lark, thrush, blackbird, starling, owl, redpoll, yellow-hammer, cirl-bunting, minah, magpie, rook, black swan, Canadian goose.

2. **Domestic (and other) Animals.**—Cat, dog, horse, donkey, mule, cow, sheep, pig, goat, deer (red and fallow), wapiti, moose; ferret, stoat, weasel, opossum, wallaroo, mouse, rat.

3. **Fish.** — Trout (brown, rainbow, and salmon); quinnat and Atlantic salmon.

4. **Insects.**—House fly, honey bees, humble bees.

C—INDUSTRIAL* AND ECONOMIC†

1.—NATURE AND MAN

Man's wants are many, but his first needs are food, shelter, and clothing, and his first object is to supply himself with these.

Nature favours the life of man in New Zealand by giving him a healthy, temperate climate in which to live and work; a fertile soil in which to grow crops, or upon which to rear sheep, cattle, and other useful animals; and valuable natural resources, chiefly in the shape of plants and minerals, which he may turn to his own use. At the same time man cannot always satisfy his needs in his own way, for Nature decides where and how he shall live. She has surrounded him by air, water, and land, and it is the varying forms and conditions of these that control his life. In other words, the physical features of the land in which he lives, its climate, and its natural resources, have great controlling influence over him. Let us then inquire:—

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*"Industrial" means relating to industry, that is, occupation, manufacture, or trade.

†"Economic" means pertaining to the wealth-producing power of a country and its people. The "Economic Geography" of a country teaches us where, how, and why goods that are bought and sold are produced, distributed, and exchanged.

A.—How Far Nature Controls Man in New Zealand.

1. **Extent of the Country.**—Man cannot make a permanent home upon the sea; hence the size of the country in which he lives is of great importance to him. At present New Zealand is only thinly peopled, and there is no immediate fear of overcrowding.

2. **Mountains.**—High mountains in temperate regions can never become the home of man except where there are rich mines; for the climate is too cold and stormy, and the soil too thin and poor to support either vegetable or animal life. As New Zealand is a mountainous country, much of her surface, especially in the South Island, is uninhabited. Mountains are always a serious barrier to free transport and communication and force man to expend much labour to overcome them by roads, railways, and tunnels. The Southern Alps, for example, have greatly hindered the progress of Westland. Still, the lower mountain slopes furnish summer pasture for large flocks of sheep, or are clothed with valuable forests, or supply useful minerals, while her lofty ranges help to make the rainfall plentiful and also store water for her many rivers.

3. **New Zealand Rivers** hinder free transport and communication on the plains, and are either too swift or too dangerous from sand or shingle bars at their mouths to be useful for navigation. Small vessels ply on the Wairoa*, the Waikato, the Wanganui, and the Clutha, but even the mouths of such rivers as the Wairoa,† the Buller, the Grey, and the Hokitika will never become good harbours. This is one reason why towns do not naturally spring up along their banks as they have done on English navigable rivers like the Thames, the Severn, and the Mersey; or on the Ganges in India; or the Mississippi in North America. Still our rivers are of great value in many ways. A few growing towns such as Cambridge, Hamilton, Ngaruawahia and Huntly (coal) have sprung up in the mid-Waikato, several mining settlements, Roxburgh, Alexandra, Clyde, Cromwell, on the Clutha, and a number of farming and dairying centres, Riversdale, Mandeville, Gore, Mataura, Edendale, and Wyndham, on the Mataura. Their mountain-gorges lead to passes or form the connecting link between the east and west coasts, *e.g.*, the Manawatu Gorge in Wellington, and Arthur's Pass between the head waters of the Waimakariri and the Otira (see p. 32). They supply the plains with water for farming and stock-raising, and most of the towns with drinking-water. Their current and falls,‡ now running to waste, possess an enormous amount of power that could be used for driving machinery. In this motive power New Zealand has one of the chief necessaries for becoming a great manufacturing country.

*Wairoa North. See page 39. †Wairoa South. ‡See page 138.

The beauty of the Wanganui, the Buller, and other rivers attracts visitors to our shores.

Reference has been made (see p. 45) to the great number of river-terraces in New Zealand. These terraces play an important part in the opening up of new country. Their even surfaces render road-making an easy matter. Their rich soil or valuable forests attract the settler, while in auriferous country rich finds of gold may be made along their course in "pockets" or "leads," where they have been laid in distant ages by river action.

4. **Plains.**—Level or gently sloping ground always presents fewest obstacles and most attractions to man, and so is chosen as the site for most towns. On New Zealand plains, once the chief rivers are bridged, transport and communication are easy by road and railway, and ports are close at hand. They include some rich farming land besides a great extent of poorer country suitable for grazing sheep. That which was once bush has now mostly been cleared and brought into cultivation. Hence most of our towns are situated on the plains near the sea-coast and below a height of 1000 feet. Roads and railways link them together. With the exception of mountain summits the poorest soil in the Dominion is that on the Volcanic Plateau where the rocks are not old enough to have changed into a condition fit for plant food. This district is, therefore, thinly settled.

5. **Coast-line.**—In all new countries settlers first turn their attention to occupations connected with the soil. New Zealand is still a young country and so her people are chiefly occupied in lumbering, farming, and pastoral pursuits. As she has not yet engaged very largely in manufactures, she is obliged to look abroad for her chief supply of manufactured goods. The coast-line thus becomes a feature of importance. New Zealand has a long coast-line—about 4,300 miles—which is deeply indented in parts, but unfortunately most of the openings are blocked from the sea by sand-bars, or from the land by a wall of mountains, or occur where there is little back-country to support a thriving harbour. At a few points on the coast—as at Timaru, Oamaru, New Plymouth, and Napier—the nearness of rich farming and grazing land has made it worth while to make harbours by means of breakwaters. The nearness of the east and west coasts to each other is an aid to communication, and has an important influence in moderating the extremes of climate and promoting the growth of vegetation.

6. **Lakes.**—The lakes of New Zealand, though numerous, do not attract settlers as the shores of the Great Lakes of Canada and the United States have done. Both hot and cold lakes are visited chiefly for the sake of their scenery, and the steamers plying on them chiefly carry tourists. The reason is that our lakes are not as a rule surrounded by fertile land. They are

either hemmed in by high mountains fit only for grazing sheep or by poor volcanic soils. Tokaanu, on Lake Taupo, an old Maori village, owes what little importance it now has to the tourist traffic, and Queenstown on Lake Wakatipu would be only a very small mining centre but for the same cause. Our lakes can be used as sources of electric power; but, as in the case of Lake Coleridge, the power generated will have to be carried a long distance to more convenient centres of manufacture.

7. **Volcanoes.**—Ancient volcanic soils are rich in plant food. Hence, such land, when low, as near Auckland, is suited for cropping, when high, as in the Banks and Otago Peninsulas, for grazing sheep and cattle. Much of the Volcanic Plateau is of recent formation, and hence is almost barren. In districts near active volcanoes man finds it safer to build in wood than in brick or stone. In this connection it should be noted that many of the buildings in Wellington, which was formerly thought to be subject to severe earthquakes, are now built of brick and stone.

8. **Climate.**—Given a rich soil, the temperature and amount of rainfall determine what can be grown, and hence what man shall do, what his occupation shall be. The heavy rainfall on the west has produced dense forests. This gives rise to saw-milling, and as soon as the land is cleared, to cattle-raising and dairy-farming, as in Westland and Taranaki. The drier eastern plains are favourable to the growth of grasses or crops of temperate lands, and so the different branches of farming occupy the people on the Hawke's Bay, Wairarapa, and Canterbury Plains. It is chiefly the favourable climate that makes Auckland, Hawke's Bay, Nelson, Canterbury, and Central Otago able to grow good fruit, that enables the North Island to grow maize, and that makes Canterbury and Northern Otago excel in wheat-growing, and causes Southland to produce more oats than wheat. Climate also assists man to locate mineral deposits, for the heavy rainfall on our western mountain slopes has in some cases laid bare seams of coal and veins of gold-bearing quartz.

9. **Natural Resources.**—In New Zealand these include fertile soil, pasture grasses, flax, kauri gum, timber forests, and minerals such as coal and gold, iron and petroleum. Rich soil attracts the farmer, and pasture grasses the grazier. Saw-mills and flax-mills naturally spring up where timber and flax are growing, and mines are situated where coal and gold are found. The quality and distribution of soils is a natural resource which largely controls pastoral and agricultural industries. Hence the situation of natural resources in a country decides where farmers, graziers, millers, and miners shall live.

These are some of the ways in which Nature exercises control over man. Let us now consider some of

B.—MAN'S VICTORIES OVER NATURE IN NEW ZEALAND.*

The lives of savages and wild beasts are in nearly every respect controlled by Nature, but by the aid of reason man has succeeded in overcoming Nature to some extent in certain directions. In New Zealand he has conquered **mountains** by railways, viaducts, and tunnels; **rivers** by bridges; the **sea** by the steamboat; and **distance** by the aid of telephony and telegraphy. Thus he has overcome obstacles to transport and communication.

The lack of useful native plant and animal life he has met by introducing from other temperate lands suitable plants and animals, which thrive in their new home and now form the chief wealth of the people. Then he has had some success in his struggle with various destructive agents. Frost and storm, cold and heat, he fights with hot-houses or shelter belts; drought with the aid of water races; the wasting of the sea by reclaiming land; the dangers of earthquakes by the use of wooden buildings; and blights and other pests by spraying or poisoning, or the introduction of their natural enemies. Swampy lands he has drained; river-erosion he has checked by stone and wire groynes and other protective works; he has planted trees, shrubs, and other vegetation to check drifting sand† and the wasting of soil, to control river currents and flood waters, to promote a more uniform degree of atmospheric humidity, to conserve the water supply, and furnish timber and firewood. Poor soil he makes rich and rich soil richer by manuring and irrigation.‡ His food he preserves by freezing and cold storage and other means. Wind and water he harnesses to pump water for him, and the latter also to wash gold and to generate electricity. He taps artesian water supplies and fills reservoirs so as to be independent of surface stream or rainfall. He builds harbours where Nature has made none. Raw material which he needs in his manufactures, and which the country does not supply, he gets from over-sea, as he also does numbers of useful manufactured articles which he has not the means to make. He migrates from one place to another, seeking to escape the evils of one environment and to secure the advantages of another.

Thus man submits to Nature when he must, but circumvents or masters her if he can. Yet his mastery of Nature is never complete; indeed his successes are only seeming victories; for in all his struggles to overcome natural obstacles Nature sets the limit of success. He may succeed only so far as she permits. In every case his tasks are set by Nature. His labour is not altogether a matter of choice, but one of necessity. He is, therefore, often really obeying Nature's laws even when seeming to triumph over them.

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*Or in other words, "Man's response to Nature's control."

†Cf. sand fixation and reclamation of Oroua Downs (a three-mile coastal strip between the Rangitikei and Manawatu river mouths).

‡See Appendix V.

2.—EXPORTING INDUSTRIES*

A.—PASTORAL INDUSTRIES

As we have seen, New Zealand is a new country, and her industries are those directly connected with the soil, that is (1) pastoral,† (2) timber and gum, (3) agricultural,‡ (4) flax, (5) fruit, and (6) mining. Of these the pastoral industries are by far the most important, as is proved by the fact that over 90 per cent. of our exports come from this source. These industries, along with agriculture (page 80) and mining (page 90), are called **primary** industries; manufactures and commerce being designated **secondary** industries. The importance of the pastoral industries is due to the fact that New Zealand is fitted to rear large numbers of sheep and cattle by her situation, climate, rainfall, extent of native pasture (tussock grasses), and of other lands upon which English grasses will grow well. The pastoral land is well distributed throughout the country. On all the richest of the lowlands agriculture and sheep and cattle rearing go hand in hand, while on the poorer grades of level country and on the lower mountain slopes sheep farming is the chief occupation of the people. In the year 1923-4, 43½ million acres, or about three-sevenths of the area of the Dominion, was occupied for pastoral and agricultural purposes. It is therefore the animal industries of the Dominion that provide our staple products, namely wool, dairy produce, and meat, together with such important by-products as skins, hides, tallow, etc.

(*a*) Sheep

Number of Sheep.—The following are the conditions governing the number of sheep in a country such as New Zealand:—

(1) **The Food Supply.**—This is governed by the extent and richness of pasture and the amount and quality of the culti-

*For convenience of arrangement and comparison some details of imports are included in this section along with corresponding exports.

†Lat. *pasco*, I feed. Also, *pastor*, a shepherd.

‡Lat. *ager*, a field; *colo*, I till.

vation practised. In New Zealand* in 1923-4 out of 43½ million acres of land under occupation nearly 15 million acres were in native (tussock) grass, nearly 16½ million acres were in permanent pasture (grasses and clovers), while over one million acres were in grasses and clover for seed and hay or in root crops. The demand for fat lambs and sheep to which the frozen meat industry has given rise has led to the increase of mixed farming, that is, the rearing of sheep hand in hand with agricultural farming. Lambs and sheep are fattened on cultivated grasses and forage-crops, such as turnips, rape, and lucerne. The soil and climate throughout New Zealand are generally favourable to sheep-farming, and by increased cultivation and manuring, the land is made to yield more and more food, so that the carrying capacity of the sheep country has been in some cases more than trebled. Weather conditions not only control the quantity and value of the food grown and so govern the number of sheep that may be fed, but also have considerable influence on the death rate. New Zealand is not subject to continued drought, which in Australia carries off millions of sheep, but it has occasional dry seasons, which lead to a reduction of flocks, and there are occasional storms of snow or cold rains which may carry off some thousands of sheep on the exposed highlands. One serious tax made upon the food supply chiefly in the southern parts of the Dominion is due to the rabbit pest.

(2) **The Rate of Natural Increase.**—This is controlled chiefly by the health and breeding of the sheep and by weather conditions. In New Zealand the rate is high though it varies, with the breed of sheep, the locality, and the season, from 40 to 110 per cent.

(3) **The Price of Land.**—In countries where the land is in greater demand for other purposes it does not pay to rear sheep. This is largely the case in the countries formerly comprising the German Empire, whose flocks decreased in half a century from 28 to 6 million, a surprisingly low number when it is remembered that the population of the country is over 60 millions. In England the land is of too high a value for wheat growing to permit of any large increase in the flocks of sheep.

The relatively low price of land, the abundant pasture, and the high rate of natural increase account for the comparative cheapness with which sheep can be reared in New Zealand.

(4) **The Number Killed.**—This is determined by local demands for fresh meat† and by the demands of the freezing

*Contrast with the Commonwealth of Australia, where English grasses do not flourish, the great bulk of the pasture consisting of native grasses and shrubs. New Zealand grass land is, therefore, about nine times as productive as Australian.

†New Zealanders eat more meat per head of population than any other people in the world except Australians.

industry. For frozen lambs and frozen mutton of medium weight and prime quality the demand for export is almost unlimited. A set-back, however, is given to all branches of the sheep industry if the number frozen includes too large a proportion of ewes; and flocks tend to deteriorate if the best ewe-lambs are slaughtered every year.

(5) **The Demands made upon Pasture for other Purposes.**—In New Zealand the expansion of the sheep industry is limited by the growing demand for land for dairying purposes. Farmers will give their attention to whichever will pay the best.

(6) **The Number Exported and Imported.**—A very small and declining trade is now done in exporting live sheep. The number imported is also small, these being chiefly stud animals from Australia.

The number of sheep in the Dominion reached its highest point in 1918, with 26½ million. This was much higher than any State of Australia except New South Wales, which in that year had 38½ million. On the latest information available, namely the figures for 1924, Australia still leads the world in sheep rearing, while five other countries—Soviet Russia, Argentine Republic, United States, Union of South Africa, British India, the United Kingdom, and Chile—exceeded New Zealand in this industry. Owing to the greater extent of her native pasture, the South Island as late as 1886 raised nearly two sheep to every one in the North Island. As the North Island became more closely settled this proportion was gradually reduced, till in 1898 the North Island was ahead, and she has since increased her lead till in 1924 the proportion was 13½ to 10¼. During the past ten years the flocks in the South Island have grown very little, so that the 10 per cent. increase that has taken place in the flocks of the Dominion during that period is almost entirely due to the expansion of the industry in the North Island. Canterbury was for many years the "sheep province" of New Zealand, but Wellington is now in the lead. Of the Dominion's 23¾ million in 1924 Wellington owned 5⅓ million, Canterbury 4½ million, Gisborne 3 million, Hawke's Bay 2·9 million, Otago 2⅖ million, and Southland 1½ million.*

*These figures refer to "land districts." (See p. 10).

The foreign trade in live sheep is small. In 1923 some 4,000 were exported, chiefly to Pacific Islands and Australia, while about 1,500, chiefly stud sheep, were imported from Australia and the United Kingdom.

Wool.—The supply of wool depends mainly upon the number of sheep, and the causes governing this number have already been examined. The quality of the wool in any season depends largely on the weather conditions that have prevailed during its growth. The number of sheep, the total wool clip, and the average weight of fleece have grown in New Zealand with the increase of settlement and improvements in breeding and feeding. Up to the early eighties most of the sheep reared were merinos, but now over 95 per cent. of the flocks are made up of cross-breds and other longwools, as the merino is less suited for freezing, and its fine wool makes fabrics of fine quality only.

The demand for wool in the world is increasing much faster than the supply.* The wool exporting industry suffers in proportion as more sheep are killed for frozen meat. The older European countries, such as the United Kingdom, Germany, and France, which engage largely in the manufacture of woollen goods, are relying more and more upon the younger countries for their wool supply.

Wool is still the most valuable† of our exports, being usually more than $\frac{1}{4}$ of the value of the total. During the war period it formed the principal product of which the British Government commandeered our entire output. In 1914 the value of wool exported was over £9$\frac{1}{4}$ million. During the continuance of the Imperial commandeer in 1916-1920, the value of the wool exported approximated to £60,000,000. This commandeer ended June 30th, 1920. Under normal con-

*The post-war glut in the wool market was largely due to the accumulation of stocks, and to the devastation of Europe and the consequent widespread extreme poverty there causing a greatly diminished trade.

†In the case of every export the amount of money received depends on (1) the amount sold and (2) the price at which it is sold. An increase in amount sold accompanied by a fall in price may result in a decrease in total value, as happened with wool in 1909.

ditions British, American, and foreign wool buyers attend the annual sales held in the chief cities of the Dominion, and also the Sydney wool sales to which some of our wool is sent. Some of our wool, however, is still offered for sale in London. The United Kingdom is by far our best customer for this product. Other purchasers are the United States of America, France, Germany, Japan and Canada.

About 97 per cent. of the amount of wool produced in 1923 was exported, the remaining 3 per cent. being all the local mills could handle. Over 76 per cent. of the wool exported was in a greasy, that is, in an unscoured state. The five leading wool ports in 1923 were Wellington, Napier, Lyttelton, Auckland, Wanganui and Dunedin.

Frozen Meat.—The frozen meat* industry began in 1882 with the invention of machinery for freezing meat to preserve it during long distance transport. This invention has cheapened meat, and made it a common article of food in the large centres of population in the old world, and changed, as we have seen, both the class of sheep reared in the colonies and the mode of sheep-farming. There are now 45 freezing works† in New Zealand, and these are fairly evenly distributed throughout the country from Whangarei to the Bluff, and are in all cases located near the coast. Auckland has 6, Taranaki 4, Hawke's Bay and Gisborne 9, Wellington 10, Marlborough 1, Nelson 1, Canterbury 7, Otago 3, and Southland 4. These works have a daily killing capacity of over 4,300 cattle and 145,000 sheep, as well as storage capacity for nearly 7 million carcases of mutton. In addition to the above, there are 36 boiling-down works manufacturing tallow, blood, bonedust, and animal manure from the offal of abattoirs and butcheries. The meat freezing and preserving industries afford employment for over 7,000 people. The

*The first shipment of frozen meat left Dunedin in the steamer *Dunedin* in 1882.

†Four of these did not operate during the season 1923-4.

total output has been steadily declining since 1920, though the value has remained fairly constant.

Nineteen ports in the Dominion are engaged in exporting frozen meat of various kinds. Only those on the west coast of the South Island take no part in the trade. In 1923 the six leading ports were Wellington, Lyttelton, Napier, Gisborne, Wanganui, and Timaru. The frozen meat export, which formerly stood next to wool, now ranks third on the list of the Dominion's exports. New Zealand is the world's largest exporter of mutton, the next largest being Australia and Argentina. In normal times the most profitable branch of the industry is the export of frozen lambs. Taking as a guide the ports that export most meat, we may infer that Canterbury and Wellington lead in the production (or fattening) of lambs, and Wellington, Canterbury, and Hawke's Bay in the production of mutton.*

The great bulk of our meat export goes to the United Kingdom, and small quantities of certain kinds are sent to certain Pacific Islands.

A striking fact in connection with this industry is the way in which every part of the sheep is made use of. Meat not of first quality is preserved in tins or boiled down for tallow. Other by-products of the freezing works are: Tinned tongues, sausage casings, extract of meat, tallow, manure, slipe wool, pelts, hides, hair, oil, and glue; while the works south of Dunedin freeze rabbits and hares.

In fixing the site of a freezing works† an endeavour is made to secure the following advantages. Though these may be regarded as the essentials of an ideal site, few works in New Zealand possess all of them in a high degree. As to No. 1, for example, most works are idle during the late winter and the spring months, and are open only from about November or December to August,

*For frozen beef see p. 72.

†A useful exercise for pupils is to prepare a similar list of qualities that should be possessed by an ideal site for any particular industry. See pp. 73, 86.

according to the supply of lambs, etc., and even then are not always working at full capacity.

(1) **Nearness to large and constant supplies of raw material,** *i.e.*, fat sheep for killing.

(2) **Cheap land and low rates.** A freezing works occupies several acres and hence is built on the outskirts of some country township. For sanitary reasons such works are placed at some distance from cities.

(3) **Good means of transport and communication,** by road rail, and telegraph.

(4) **Ample water supply,** artesian best, because purest.

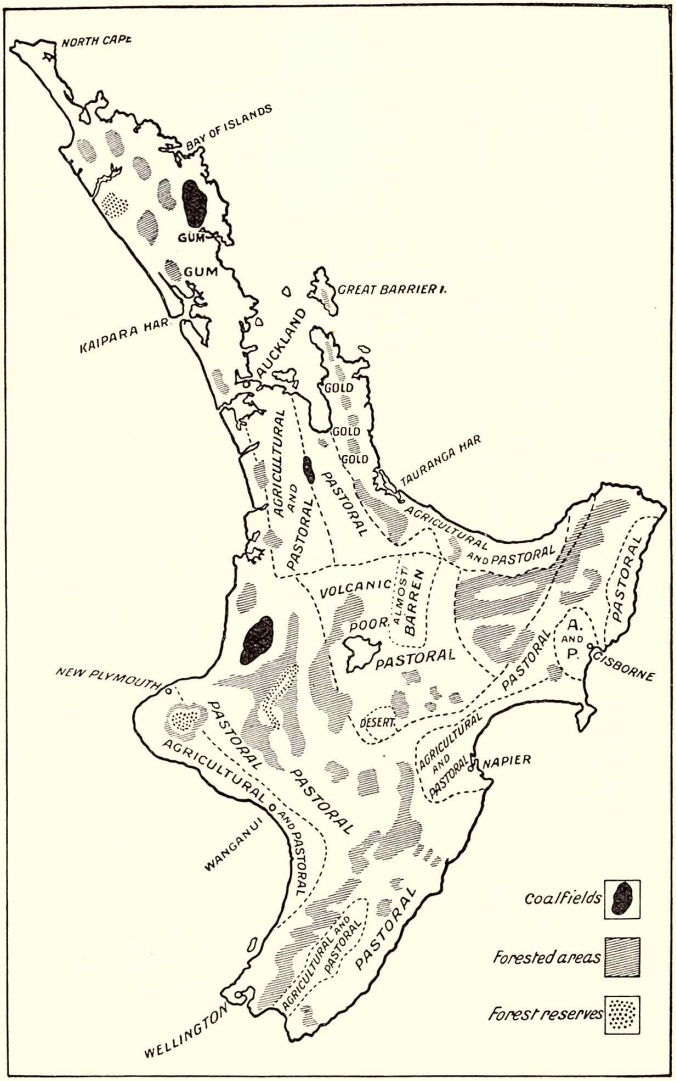
(5) **Nearness to point of export,** *i.e.*, seaport.

(6) **Good drainage,** to carry off waste products, which are now reduced to a minimum.

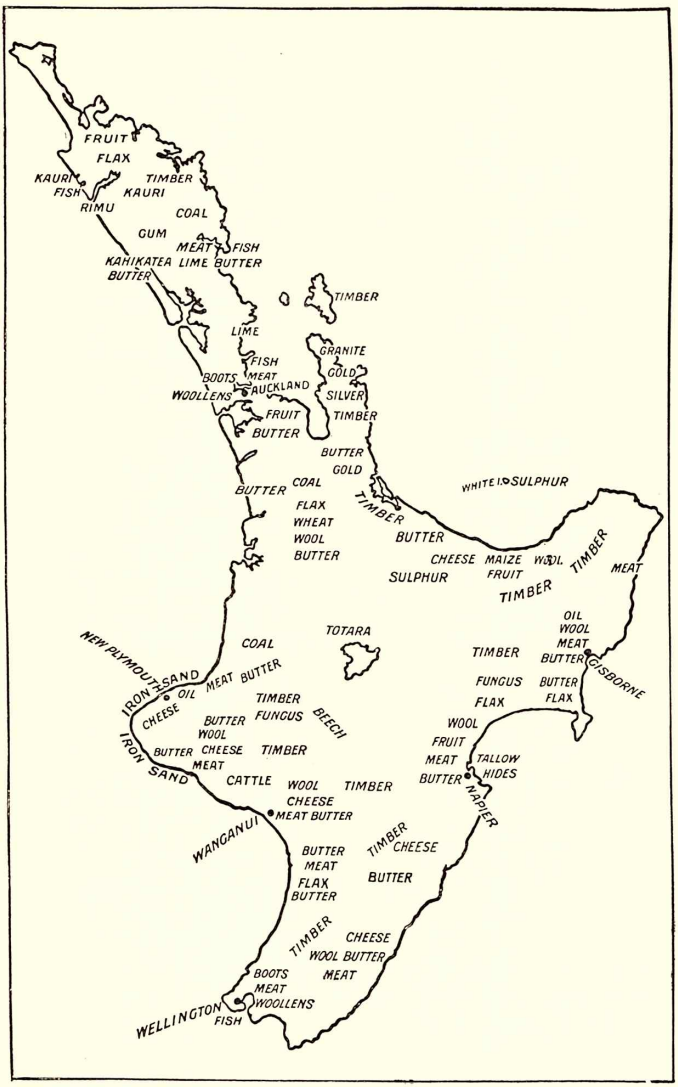
(*b*) Cattle

From what has already been said, it will be seen that domestic animals have two values, (1) when alive, (2) when dead. The chief products of sheep in these two states are wool, meat, and skins. If, however, too many sheep are killed both branches of industry suffer in the end. In the case of cattle, the two rival products are dairy produce and beef (with hides); and the one industry cannot expand very fast without the other suffering. But in the case of cattle it is the product of the live animal for which the demand is expanding faster than for that of the dead. And the cattle industry is in competition with the sheep industry inasmuch as both animals require grass as a staple food.

Cattle require longer grass to feed upon than sheep, and hence are best suited to a moist climate. So far as climatic conditions and pasture are concerned, cattle would do well on all the plains and uplands throughout the Dominion. But land that is ploughable and suitable for any kind of crop is most profitably used when cultivated. And sheep farming is probably still on the whole more profitable than cattle raising. Hence large herds of cattle are reared upon back-country runs in forest districts from which the milling timber has



Map showing the Distribution of Industries and Timber in the North Island.



Products of the North Island.

been removed, though stumps and charred logs still encumber the ground. Indeed, cattle are the best stock for breaking in new ground that has been heavily timbered. Milking herds, of course, are grazed on lower country within easy reach of farm houses and dairy factories.

The number of cattle in the Dominion in 1924 was over 3½ million. In spite of the fact that the South Island has a much greater area of pasture, 80 per cent. of this number are in the North Island. This is a much higher excess than exists in the case of sheep. It is probably due to the greater rainfall and higher temperature producing, on the whole, a greater abundance of pasture. About a third of the total are found in Auckland province, Wellington takes second place, and Taranaki third. The chief cattle districts in the South Island are: the wetter parts of Southland, Banks Peninsula, the Amuri, southern Westland, and the northern parts of Nelson and Marlborough. The cattle herds are now increasing everywhere throughout the Dominion. The foreign trade in live cattle is very small. The few imported are chiefly pedigree stock from the United Kingdom, Canada, and United States. About 150 are exported in a year, chiefly to Australia and the Pacific Islands.

Beef.—During the five years, 1907-11, there was a steadily increasing export of frozen beef, valued in the latter year at over half a million pounds. This trade, however, was almost confined to the North Island, which at times also supplies fat cattle for local consumption in the South Island. In 1912 the export of frozen beef dropped suddenly to a quarter of a million pounds, but the industry had recovered somewhat when the Imperial meat commandeer (1915 to 1920) led to a greatly increased export. In 1918 its value was over £1½m. Competition with other meat-producing countries, particularly Argentine Republic (chilled beef), has caused a marked decline in New Zealand's export of beef, which in 1923 was valued at under £900,000.

Butter, Cheese, etc.—The dairying industry in New Zealand, though formerly small when compared with

sheep farming, is now very important and is expanding rapidly. The use of machinery for milking, separating, and other processes of butter and cheese making and for freezing, and the system of State loans to dairy companies, have given a great impetus to the industry, while Government inspection and grading have had the greatest influence in giving our dairy produce its high position in the markets of the world. Seventy-six per cent. of the dairy cattle of the Dominion are in the North Island. The chief dairying districts are: Auckland, Taranaki, Wellington, Otago, and Southland, though creameries (butter factories) and cheese factories are scattered pretty generally over all country districts. They are nearly all situated near the sea and near the great lines of railway. The bulk of the butter and cheese is made in central factories (the great majority of which are owned and managed co-operatively, that is, by the suppliers themselves) which are fed by branch skimming-stations. In selecting the site for a factory, attention is paid to proximity to large supplies of milk, the supply of good water, to good drainage, and a good road for the carriage of the output to the railway station. The product is either sold at a fixed price for the season or sent direct to the London market. Butter and cheese are never made in the same room as the butter would take the flavour of the cheese. As different machinery is also required the two are often made in different factories. Cheese-making is suspended during the winter months, but some factories have a dual plant and make butter or cheese according to the demand of the market or the season of the year. Many cheese factories manufacture whey-butter. The whey that escapes from the cheese vat in cheese-making contains a good deal of fat. This is separated and converted into good butter instead of being wasted.

The total number of public and private dairy factories making butter and cheese in the Dominion in April, 1924, was 521.* Of these 156 were butter factories and

*This number, of course, does not include the numerous skimming-stations.

301 were cheese factories, while 64 were dual-plant factories. Though not included in the number of butter factories given above, many of the cheese factories also make whey-butter. In addition, there were 5 packing-houses which do not make butter, but merely buy different brands in bulk and make it up afresh for sale as milled butter. Three of these houses are in Nelson province. In 1923-4 Auckland was the leading butter province, Taranaki taking second place and Wellington third. Taranaki, however, was far in the lead in cheese production, her nearest competitor being Wellington. In the year quoted there were nearly 48,000 suppliers of butter factories and nearly 13,000 suppliers of cheese factories. Besides the butter and cheese factories mentioned there were five dried-milk factories, one condensed-milk factory, three casein factories, and one sugar of milk factory. The most striking fact about the industry is the rapid growth of cheese-making, which for some years exceeded in value that of butter. The latter, however, has reasserted its supremacy, the value of its export in 1923 being over £10½m. as against £6¾m. for cheese.

More than $\frac{11}{12}$ of our dairy produce goes to London and West of England ports. The rest goes to Australia, United States, Canada (Vancouver), and the Pacific Islands. The ports that lead in the export of butter are: Auckland, Wellington, and Lyttelton, while the leading cheese-exporting ports are: Wellington, Auckland, and Lyttelton. Besides Victorian produce our greatest rivals in the English market are Danish butter and Canadian cheese. It is fortunate for us that, owing to the difference in our seasons, our produce arrives at Home during the English winter, just when the supplies from the northern hemisphere are running short. The prospects of the dairying industry in New Zealand continue to be hopeful. Danish and Swedish butter and Canadian cheese are finding expanding markets nearer at hand, and the demand for New Zealand dairy products is growing rapidly. Not the least promising feature of the industry is the increasing importance of

cognate branches, namely, the manufacture of Stilton cheese, casein, whey-butter, sugar of milk, chick-feed (from albumin), condensed milk, and dried milk (glaxo).

(*c*) Horses

After sheep and cattle, horses rank next in importance among farm animals. There are 330,000 horses in the Dominion. This number represents a decline of over 9 per cent. in the last 5 years. The general use of motor-cars and lorries, and of electric trams in the cities, and the high prices ruling for other farm products are no doubt the chief causes of this. The foreign trade in horses is very small. The export amounts to a few hundred a year, chiefly to the south-eastern States of Australia and Fiji. The imports number over a hundred and these come chiefly from New South Wales and Victoria. The provincial district of Auckland has the most horses. The greater extent and roughness of the province and the relatively poor roads there are in part the causes of this. Canterbury comes second, Otago and Southland next, and Wellington fourth.

(*d*) Pigs

Pig-breeding declined for some years prior to 1919. Since that date a steady annual increase has occurred, the number in the Dominion in January, 1924, being 414,000. The chief pig-rearing districts are Auckland, Wellington, Canterbury and Taranaki. Pigs are of great value for pork, bacon, and hams, for which there is a large demand, the prices being very high. Only about four hundred live pigs are exported a year, and 99 per cent. of those slaughtered are consumed in the Dominion. Pigs are fed on pasteurised* skim-milk and whey from the dairy factories, green fodder, and roots, and fattened for killing on unthreshed peas and meal. Ham and bacon-curing is carried on at some 38 works, including some of the freezing works, *e.g.*, Picton,

*That is, raised quickly to a temperature of at least 140° F. and then cooled rapidly in order to kill all germs in the milk, and so keep it from turning sour.

Islington, and Smithfield, and a number of private works, as at Woodville, Inglewood, and Christchurch. Wellington and Auckland now do the bulk of the curing.

B.—TIMBER

Value of Forests.—Though forests are formidable barriers to rapid settlement, a large area of forest is an important source of national wealth. In addition to yielding a plentiful supply of timber for house-building, cabinet-making, etc., as well as of other useful products such as fuel, gum, and bark for tanning, forests serve very useful purposes which they alone can perform. Some of these may be referred to briefly:—

(1) The decay of dead leaves and trees forms a vegetable mould which greatly enriches the soil upon which they fall.

(2) Trees shade the earth and by preventing too rapid an escape of moisture help to make the climate moist.

(3) Trees protect the soil, particularly that upon mountain slopes, their roots bind it together and so prevent it from being washed away by heavy rains or from being blown away by strong winds.

(4) The roots of trees force their way into the soil and enable moisture to reach great depths, while many kinds (*e.g.*, conifers) develop nodules of nitrogen-fixing bacteria, and so enrich the soil.

(5) The forest covering holds the rain and so prevents it from running away at once to the sea.

(6) Forest scenery adds not a little to the pleasure of the inhabitants of the country, and attracts visitors from overseas.

Man needs timber for a great variety of purposes, and is therefore induced to cut down forest. But though timber itself has value, the land when cleared of trees becomes of much higher value as pastoral or farming land. It is this fact which in all countries has brought about a more or less wholesale destruction of trees,* the evil results of which are alarming. A consideration of the benefits derived from the possession of forests makes it easy to realize the evils that follow upon stripping the earth of its natural covering. Timber (be-

*Called "deforestation." It is a lamentable fact that even when felled for timber more than half the wood is wasted. The reverse process or extensive planting of trees is called "afforestation."

sides other forest products, such as gum, bark, and fungus) and phormium fibre are the only native vegetable products in the Dominion that are of value for export.

Area in New Zealand.—New Zealand has 12½ million acres,* or less than ⅕ of its area, still covered with forest. This is a proportion exceeded by most of the countries of Northern, Central, and Eastern Europe, as well as by the United States, Japan, and British India. Australia has less than 1-20th of her area in timber, while the United Kingdom has barely 4% of her area in forest. Careful calculations show that our existing supply of timber may not last another fifty years. Though some planting is being done by the Government in various parts of the country (*e.g.*, at Rotorua and Hanmer), very much more will require to be done if future needs are to be fully provided for. Plantations in New Zealand occupy 66,000 acres.

Kinds of Timber Trees.—The character of the bush changes with the nature of the country and the elevation, though on the lower levels it is usually of mixed type. There are no fewer than 99 varieties of native trees in our forests, but of these only about ten are made use of for milling purposes. These are kauri pine, rimu (red pine), kahikatea (white pine), yellow pine, matai (black pine), totara pine, beech (black, brown, and silver), and puriri. By far the most useful of these is kauri. Even before white men settled in New Zealand, whalers and other vessels visited the Auckland coast to obtain masts and spars of kauri. It is now used for the inside of buildings and in furniture-making,† and for all general purposes. The commonest timber in the Dominion is rimu, now the chief timber used for house building. Figured rimu is largely used for the inside lining of walls. Totara is also found in all parts of New Zealand, though the supplies of it are now much reduced. The wood is deep red in colour, and though brittle does not warp or twist. It is the best timber known for use as marine piles, as it resists the attacks of the boring

*See graph in Appendix VI. Estimated at 60,000m. sup. feet.

†Mottled kauri is particularly beautiful. Samples of New Zealand woods may be seen in New Zealand museums.

toredo better even than Australian jarrah. Matai is a timber of similar properties to totara, though it is not so plentiful. Kahikatea is one of the softest of New Zealand woods, and flourishes in swampy land in forests by itself. Being formerly plentiful and cheap it has many uses (butter-boxes, etc.), but as it decays readily it is no longer in general use for building purposes. As better timbers have become scarce and dear, tawa, a light coarse wood, fairly plentiful from Nelson to Auckland, has come into use. The different varieties of beech usually grow in forests by themselves on the lower mountain slopes or on poor flat land.

The hardwoods of New Zealand are small in quantity, and are confined to certain areas. Thus puriri, a strong dark brown timber, used for fencing posts, piles, railway sleepers, etc., is confined to the northern half of the North Island, while black maire, a deep brown heavy timber, grows in small quantities in the central portion of the same island. It is an excellent timber for bridges, wharves, and work requiring material of great strength. Another timber of great hardness is rata, a red timber, sometimes called ironwood. Silver pine or Westland pine is a hard timber that lasts well in the ground, and is used for railway sleepers, kerbing, and ground floor timbers. Other native hardwoods used by wheelwrights and millwrights are manuka and kowhai.

Their Slow Growth.—New Zealand trees are very slow in growth, and take twice or three times as long as Australian trees to become fit for timber. The New Zealand timber forests have, therefore, been centuries in the making. This disadvantage, combined with the difficulty of rearing them, makes it more profitable when re-planting to form plantations of Australian and European trees.

Distribution.—The greater portion of the forest in the Dominion clothes the slopes of the main divides of both islands, and other ranges up to a height of 3,000ft. Owing to the greater rainfall there is more on the west-

ern slopes than on the eastern, particularly in the South Island. Because of the greater extent of mountains in the South Island there is more bush there than in the North. The distribution of the bush is shown in the maps on pages 70 and 84. Only a part, of course, of this bush is made up of milling timber. If virgin bush on unimproved occupied land is considered, the most heavily bushed provinces at present are Westland, Auckland, Nelson and Wellington, while the most thinly bushed are Hawke's Bay and Southland.

Timber production in the Main Trunk-King Country has reached its zenith. Felling in the great Tongariro blocks may last another decade. Supplies of white pine are nearly exhausted. The Mamaku-Rotorua region is becoming important, but within a few years Westland will become the leading milling region.

Fate of the Bush.—There are 426 sawmills* of all kinds at work in various parts of the Dominion, employing over 8,600 hands,, and as the land now under forest is cleared and sown, the pastoral and agricultural industries of the country grow in proportion. Instances of forest lands that have been brought into occupation occur in all parts, *e.g.*, much of the kauri bush in Auckland, the Seventy-Mile Bush, the Forty-Mile Bush, Taranaki bush from Mt. Egmont eastwards, Hawke's Bay totara forests, parts of the Waimarino and Awarua Forests, beech forests of Oxford, Mt. Somers, and Waimate in Canterbury, as well as Catlins and other forests in Southland. Towns occupying the sites of forests are Eketahuna, Pahiatua, Norsewood, Taumarunui, Raurimu, Waimarino, Taihape, Ohakune, etc. Though ring-barking is not used in New Zealand as in Australia, it is a deplorable fact that in the drier districts fire is made use of to hasten the process of converting bush land into grazing or farm land.

Output.—The output of sawn timber from New Zealand sawmills during the year 1922-23 totalled 304 million superficial feet, of which the principal items were:—Rimu 155m., white pine 66m., matai 23m., kauri 22m., totara 20m., beech 5m., and pinus radiata 7½m.

*Only 357 of these are bush mills.

Nature and Value of Timber Trade.—Timber to the value of between £400,000 and £500,000 is exported yearly from New Zealand, chiefly to Australia and the Pacific Islands. Pines, especially kauri, rimu, and white pine, and beech-wood are sent to Australia. Fiji and other Pacific Islands, and the United Kingdom take the remainder of an export that usually approaches 50 million super feet.* The leading exporting ports in order are Greymouth, Auckland, and Hokianga, while Taranaki and Canterbury ports have no export. Forest products comprise only from 2 to 3 per cent. of our exports. New Zealand is rather lacking in hardwoods. These are imported from Australia, *e.g.*, varieties of gums, ironbark, jarrah, and V.D.L. (a Tasmanian or Van Diemen's Land gum). Oregon pine, a general purpose timber, hemlock and hickory are imported from Canada and the United States, and Baltic pine and cedar from Europe.

C.—AGRICULTURE

Agriculture is of great value inasmuch as it helps to supply food for our people and our domestic animals, but as an exporting industry it is of small importance in comparison with the pastoral industries. It includes the growing of cereals and vegetables for human food, and of fodder crops for all kinds of stock. Cereal crops grown in New Zealand are wheat, oats, barley, rye, and maize, though the two last named are not much used as human food. During the war period, owing largely to the withdrawal of young men from agricultural work, cereal cropping showed a declining tendency. The only vegetables of more than local importance are onions and potatoes. The fodder crops include grasses, clover, lucerne, peas, beans, mangels, turnips, rape, and linseed. This industry is confined to the ploughable lowlands where climate and soil are favourable. Of the total area of 18m. acres under cultivation in

*The export of white pine, matai, and beech is now restricted to the quantity produced in excess of that required for use in New Zealand, while that of totara and matai heart is prohibited.

1923-4, about 650,000 acres were in grain and pulse crops. Less than half of this acreage was sown for threshing purposes. The area under crops of all kinds in New Zealand averages about 1⅔m. acres. This represents less than 4 per cent. of the total area of occupied land. In recent years agricultural produce has made up from 1 to 2·3 per cent. of our exports.

Wheat.—Wheat requires rich soil and strong summer heat, but will grow where the rainfall is not great. It cannot stand continued wet weather, though short periods of heavy rain are not harmful. It is easily beaten down by strong wind, especially if accompanied by rain. There are many varieties of wheat, each of which is best suited to a particularly locality,* *e.g.*, the wheat grown in Canterbury must be able to withstand the violent hot nor'-westers that sweep over the Plains in summer. The chief districts of the Dominion where wheat can be grown are the lower Waikato Plain, the Manawatu Plain, the upper Wairarapa Valley, all parts of Canterbury below 1,000ft. above sea-level (that is, plains and downs), and similar portion of Otago and Southland. The bulk of our crop is raised in Canterbury (81 per cent. in 1923-4) and North Otago. The average yield per acre, which is nearly 28 bushels, is a little below that of the highly-cultivated lands of Europe, but more than double that of Australia.

Wheat is the most important of the farm crops of New Zealand, and yet it amounts to only a small fraction of recent wheat crops raised in the United Kingdom, and is very insignificant compared with the quantity raised in United States, Russia in Europe, France, Canada, India, and even Australia. While it pays some of our farmers better to raise sheep and cattle for meat and dairy produce than to grow wheat, there are many others in Canterbury and North Otago whom mixed farming pays best, and wheat growing has its place in the customary rotation of crops. The industries of poultry, calf, and pig rearing are all closely dependent

*For example, Hunter's A1 or College Hunter's, a superior variety raised by careful selection at Canterbury Agricultural College.

on wheat growing. The amount of land put down in wheat has always varied very much, according to the price at the time or the expectation of better returns from other crops or from sheep and cattle. The largest area under wheat for threshing since 1909 was 352,000 acres in 1921-22, and the smallest was 139,000 acres in 1919-20. The average total crop has been about 6½ million bushels. During the past ten years, except in 1922 and 1923, when there was a surplus for export, we have been obliged to import from Australia or from Canada. The quantity imported has ranged from 300,000 bushels to over three million in 1923-4.

This shortage of wheat materially affects our supply of its chief product, viz., flour.* In the ten years preceding 1915-16 our flour-mills declined in number from 77 to 53, owing to the closing down of the smaller country grist mills run by water power. The number of mills was still the same in 1922-23. The existing mills are very efficient, and are capable of gristing more than double our requirements; but they manufacture a surplus to export or carry over only when wheat is plentiful. Besides what is supplied as ships' stores, a very small quantity of flour is exported. This goes from Auckland to some Pacific Islands. A varying quantity is imported from Australia. Australian flour has a much lower moisture content than the local product, and is therefore largely used to mix with it.

Oats.—Oats require a moist climate with not too hot a summer, and hence in Europe grow well in the north of Scotland and even in colder lands. In point of acreage oats are the most important of our crops. Some oats are grown in every province of New Zealand, though Canterbury and Otago grow by far the most, Southland taking third place. Oats are used as horse-feed and for human food in the form of oatmeal. The bulk of our oat crop is consumed in the form of chaff, hay, or ensilage without threshing, the proportion that has been threshed in recent years being about ⅓. The amount of

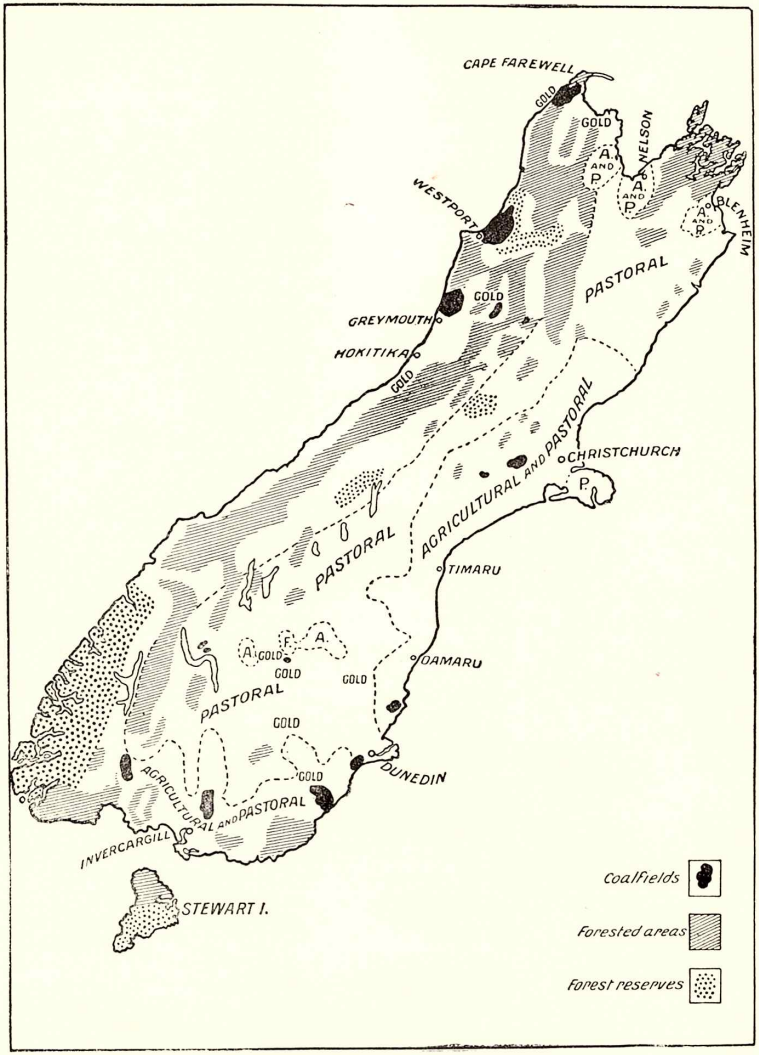
*Other flour-mill products are wheatmeal, bran, semolina, pollard or sharps, and stock foods; also oatmeal and patent breakfast foods.

the oat crop, like that of wheat, has always varied considerably, the amount threshed averaging over 6 million bushels. The average yield per acre is 38½ bushels. In recent years a small and fluctuating quantity has been exported, chiefly to Australia, Fiji, and other Pacific Islands. During the same period varying quantities have been imported from Australia, the import for 1924 being exceptionally high.

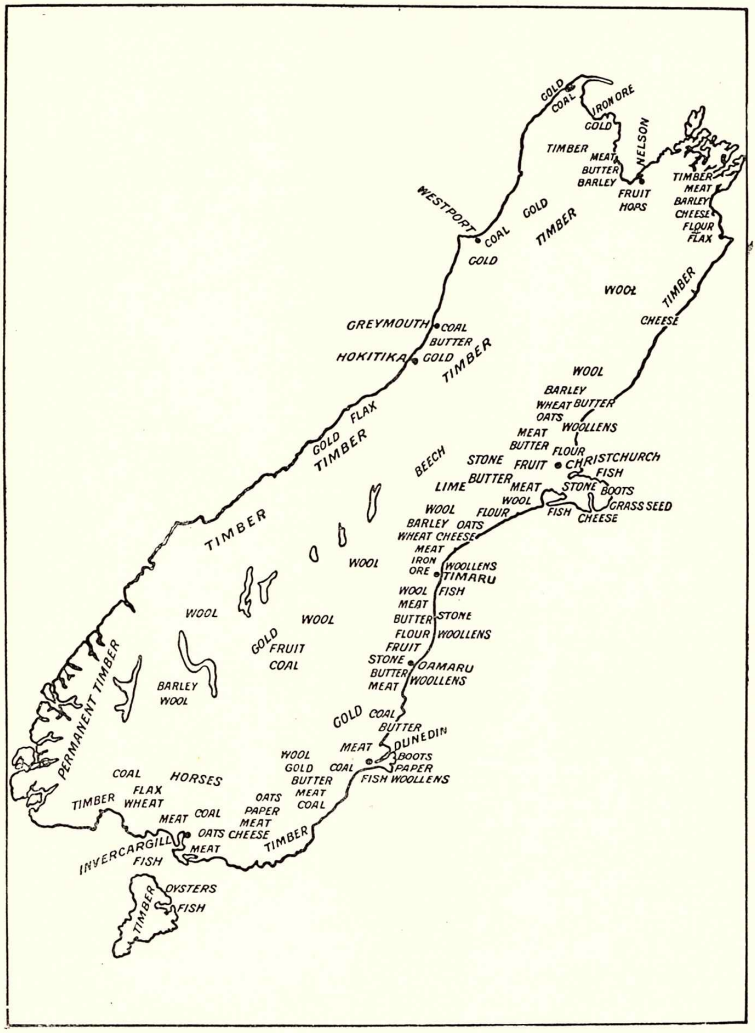
Barley has a wider range than other cereals. It ripens quickly, and so can do with a moist and cool climate; but it prefers a warm and fairly dry climate. Hence we find it growing with wheat in warm districts and with oats in cooler parts of the country. The barley harvest of the Dominion is small and fluctuating. For the two seasons 1920-22 it exceeded 1m. bushels, but during 1922-24 the annual yield fell to ½m. bushels. The provinces that lead in the cultivation of this cereal are Canterbury, Otago, Marlborough, and Hawke's Bay. Besides its use as a fodder, barley is largely made into malt for brewing beer. The export of this cereal has declined to a negligible quantity and a small quantity is annually imported from Australia.

Maize, a cereal which requires a warm climate, is grown chiefly in Auckland and Hawke's Bay. The total crop threshed for seed averages ½ million bushels. A very small export trade is done with some of the Pacific Islands, while Auckland and Wellington import a small quantity each year from South Africa and Australia.

Root Crops.—Those raised for human food are potatoes and onions. The area in potatoes during the past ten years has averaged about 20,500 acres, and the yield for the past five years has averaged 5½ tons per acre, or about double the yield obtained in Australia. There is both import and export trade in potatoes, and the imports are in some years greater than the exports. The imports are chiefly from Fiji and Australia. Varying quantities, usually small, have been exported in recent years to Fiji and other Pacific Islands and Australia. Onions are the only other crop



Map showing the Distribution of Industries and Timber in the South Island.



Products of the South Island.

(A useful exercise for the student is the preparation of a large map locating the chief products of the island.)

for which a demand exists abroad. Canterbury raises the bulk of the crop. Canada, Fiji, and Australia usually take what little surplus we have.

D.—FLAX

New Zealand Flax* (or *Phormium tenax*) grows freely in every province of the Dominion, but in commercial quantities only in swampy districts. The best flax lands occur near the Kaipara Harbour, in the Waikato, Manawatu, and other river basins, in the valleys and swamps of Westland, and in Southland. Of the 43,000 acres of flax land in New Zealand, nearly $\frac{1}{3}$ is in Wellington province and nearly $\frac{1}{4}$ in Westland. Auckland province has more than $\frac{1}{5}$, and Southland over $\frac{1}{8}$. Flax-dressing was almost a fine art amongst the Maoris, and the application of machinery to the various processes in the preparation of hemp and tow has continued the industry to the present day. Flax-mills are situated in country districts where land required for drying or bleaching is cheap, and where communication is easy by road or rail with sources of supply and with markets. They are scattered over both Islands and give employment to about 750 people. In 1905-6 the number of mills in the country was 240. In 1925, 90 mills were registered. Of these 24 were in Wellington, 25 in Auckland, and 19 in Southland. The largest mills are located in the Wellington (Manawatu) district. The product of the mills is made into tow, rope, cordage, and twine, which is but little inferior to that made from its chief rival, the famous Manila hemp of the Philippines. Indeed, the flax industry in New Zealand is controlled by the price ruling in foreign markets for the more cheaply produced Manila hemp. Rope and twine works (numbering 9 in 1922-3) have been established in the larger towns. Attempts at the artificial cultivation of flax have met with some success, though the industry at present depends chiefly

*See pp. 55, 58, and 77.

upon wild growth. During the past ten years the value of the annual export of fibre and tow has ranged from about £·3 million to £1⅔ million, the highest returns being received in the years 1916-18. This rise has been due to higher prices, and not to the increased quantity exported; for, as already stated, the number of mills in the country has decreased. The ports leading in this trade are Wellington, Foxton, Auckland, and Dunedin (with Bluff). Nearly the whole of the export has gone to the United States, the United Kingdom, Australia, and Canada.

"Yellow-leaf" disease, formerly prevalent, is now more rarely seen. A new system of "side-cutting" green leaf and leaving two centre blades on each root promises to double the yield.

The output of the flax-mills is classed as hemp, tow, and stripper-slips. Each class is graded for export by Government officers.

In the flax-milling industry deplorable waste results from present methods. Out of 100 lb. of leaf only 12 lb. of marketable fibre is secured. From the waste could be manufactured alcohol (in great demand for industrial purposes), as well as potash and nitrogen.

E.—FRUIT-GROWING

The climate and soil of New Zealand are highly favourable to the production of a great variety of fruits. As the islands stretch through thirteen degrees of latitude, they are able in different districts to grow sub-tropical fruits as well as the stone, pip, and berry fruits and nuts of Northern Europe. The great enemies of fruit cultivation are frost, hail, wind storms, and blights. Very little can be done to fight frost except by growing shelter trees, using hot-houses, or by lighting smudge fires. Blights, however, are combated by the use of blight-proof stocks and regular spraying, according to instructions and regulations enforced by the Government. The provision for cool storage of fruit in various parts of the Dominion, as at Auckland (Southdown), Hastings, Nelson, Motueka, Christchurch, and Dunedin tends to foster the industry by preventing

waste, and by securing higher prices for the growers, as well as a steadier supply for consumers.

There are nearly 30,000 acres in vineyards and orchards in New Zealand, about 27,000 acres of which are planted for commercial purposes. Nelson leads in the area of orchard land with over 8,500 acres, the two Auckland districts rank second with nearly 8,000 acres, and Otago stands third with nearly 5,000 acres. The chief crop consists of apples. Large areas of poor pumice lands in North Auckland and manuka scrub land in Nelson have proved admirably suited for apple-growing. Nearly half of the trees now planted are too young to bear heavily. There are over 800 glass-houses in the Dominion used for the production of tomatoes, table grapes, etc.

Sub-Tropical Fruits.—These include oranges, lemons, limes, grapes, figs, and olives. The conditions most favourable to the growth of these fruits are a fairly good quality of soil combined with a warm, moist atmosphere. These exist to a certain extent in Auckland, in the southern portion of Hawke's Bay, and in parts of Wellington. The nearest approach to these conditions in the South Island is found on the shores of the Marlborough Sounds, and near Nelson. But only in the extreme north of the Auckland Peninsula is the climate hot enough to ripen oranges perfectly, while pineapples and bananas will not grow in the Dominion at all. Much attention is being paid to viticulture or the cultivation of grape vines. The latter are too tender to withstand frost or biting winds. Hence they are unsuited to the Canterbury Plains, but thrive in the open air in all parts of the North Island, in the north of the South Island, and in Central Otago. But grapes grown in the open air have not the sweetness and richness of flavour possessed by hot-house and imported fruit. The favourite situation for a vineyard is on a hillside facing the sun. Good wine is made from the fruit in Auckland and Hawke's Bay. The limestone hills of Hawke's Bay offer the following great advantages for growing grapes for wine-making: — (1) the best wine-producing vines

do well there; (2) the colour of the greyish-white soil and its power of reflecting heat help to ripen the fruit; (3) there is less fog and more wind on the hills and so less danger from diseases due to damp. The total acreage in vineyards is 195 acres.

English Fruits.—Stone fruits will do well under similar conditions to sub-tropical fruits, except that they are able to stand frost better. Hence they are grown from one end of the Dominion to the other. Currants and berry fruits do best in the South Island. Insufficient moisture can be made up by irrigation.* Apples can do with less moisture than softer fruits, and so form the best crop grown in Canterbury, though they also flourish in the moist district near Nelson. Here clay lands with a northern aspect make the best orchards.

Canned and Preserved Fruit.—English fruits are so cheap in Auckland, Wellington, Nelson, etc., that fruit-preserving and jam-making factories have been established to make the best possible use of them. Since 1918, however, these have declined from 12 to 7 in number.† The output exceeds £¼m. in value.

Trade in Fruit.—The Dominion carries on an import trade and a small export trade in fruit. The fresh fruit imported consists chiefly of sub-tropical varieties from Australia and the Pacific Islands (especially the Fiji Islands and the Cook Islands (Raratonga)). It includes oranges, lemons, bananas, mandarins, pine-apples, coconuts, and grapes. Bananas and oranges are imported green. Fresh apples are also imported from Canada and United States for consumption in early summer.

There is hardly any possibility of establishing an export trade in soft fruits except in a canned or preserved form, and this industry exists as yet only on a small scale. The prospects of apple cultivation are good. In recent years experiments have been made in the cool storage of apples for export to London. Several trial shipments have been made with the assistance of the Government. Owing to faults in picking, packing, grad-

*See Appendix V.

†The chief centres are Auckland, Wellington, Nelson, Christchurch, and Dunedin.

ing, and storage in transit, early shipments proved failures; but later ones have given promise of a successful trade being established with the Motherland and South America. In 1923-4, ¼m. lbs. were exported to England, and over 1⅕m. lbs. to Argentina. Wellington was the principal shipping port.

F.—MINING

The nature and distribution of the minerals of a country depend upon its geological composition. The deposits of minerals in New Zealand are one of her valuable natural resources, though their relative importance is declining owing to the great increase in pastoral products. The only ones that are profitably worked are gold (including silver, scheelite, and platinum), coal, and iron.* Though quicksilver†, copper‡, and petroleum¶ deposits have been found, their production has not yet proved profitable. In 1902 the output of our mines formed 16 per cent. of our exports. This proportion has declined till in 1923 it was only 2·1 per cent.

(*a*) Gold

Gold was first discovered in the country in 1852, and before twelve years had gone by the gold industry was well established in Nelson, Otago, Marlborough, Westland, and Auckland. In the early years of the industry gold was obtained chiefly from alluvial deposits, that is,

*Deposits of iron ore occur at Parapara and Onakaka, Golden Bay, Nelson; on the seashore in Taranaki; at Kerr Point and Waitangi River, North Auckland; in the Raglan-Kawhia district; on Mount Peel, Nelson; on Mount Royal, near Palmerston; on Table Hill, near Milton; in the Lake Wakatipu district; and in the Mount Cook district, Westland.

†Quicksilver, or cinnabar, has been mined at Puhipuhi, 28 miles from Whangarei, but production has ceased for the present.

‡Copper ore has been worked at Dun Mountain in Nelson, and at Kawau and Great Barrier Islands, in Hauraki Gulf. Prospecting has been carried on near Kaeo, Whangaroa; at Maharahara, near Woodville, and at Mount Radiant, near Karamea.

¶A little oil has been obtained from several boreholes at Moturoa (near New Plymouth), but at Waitara, Kotuku (near Lake Brunner), Totongi (Gisborne), Mangaone (near Eketahuna), Waipatiki (Hawke's Bay), and Chertsey (Canterbury) drilling has been abandoned. Interest in the Paritutu (Moturoa) field has recently ben revived. New Zealand's oil supplies come chiefly from the United States, Sumatra, and Dutch East Indies.

in the form of dust and nuggets, from existing or ancient river beds. Now the greater part is obtained from quartz, that is, from veins of gold-bearing rock. The gold industry provides employment for about 2,000 men.

Alluvial* **Mining.**—Alluvial mining is confined to the South Island, and includes two classes of mining: (1) sluicing and (2) dredging. The distribution of alluvial mining is as follows:

In Marlborough in the basin of the **Wakamarina** a tributary of the Pelorus River, which enters Pelorus Sound to the west of Havelock. **Mahakipawa** is the chief mining centre.

In Nelson, at **Parapara,** near Collingwood, and round the mouth of the Takaka River, and in the Buller basin near Lyell, though the latter deposits are practically worked out.

In Westland, at **Kumara** and all down the coast from **Hokitika** to beyond **Ross.**

In Otago at **Naseby** and **Lawrence** (Tuapeka River), **Nevis,** in most parts of the bed of the **Clutha** and its tributaries the **Kawarau** and the **Manuherikia** (and Ida).

In Southland at **Nokomai.**

Hydraulic sluice-mining consists in using a powerful jet of water to wash down gold-bearing earth or alluvium into a sluice or trough where the gold can be separated; 130 such mines were worked in 1923.

Gold-dredging.—This system of gold-mining, which originated in New Zealand, is employed to rescue gold-dust from the beds of rivers and streams. It is rapidly decreasing in importance, the number of dredges at work having fallen from 167 in 1906 to 8 in 1923. Up-to-date dredging methods, including the use of hydro-electric power, are exemplified by the Rimu dredge in the Hokitika River. The Clutha River has yielded a rich harvest to dredging. As a result of the construction of the Kuwarau dam it is anticipated that

*See p. 36.

much gold will shortly be retrieved from the bed of the Kuwarau River.

Quartz-mining.—Quartz-mining, which is the most important class, employing 1,500 men, is carried on in both Islands of New Zealand, 22 mines being worked in 1923. The fields are distributed as follow:—

In Auckland at **Coromandel, Karangahake, Paeroa, Waihi,** and **Te Puke.**

In Nelson at **Reefton,** where the Blackwater mine employs most men.

In Otago at **Macrae's** west of Shag Point, and **Shotover,** north of Queenstown. Operations here are generally confined to quartz-mines in which scheelite is associated with gold.

Gold is obtained from quartz by crushing the ore in powerful batteries and separating the gold from the rock by the aid of either mercury or cyanide of potassium.

Export.—An examination of the amounts of gold exported annually during the past 20 years shows that a marked decline in the production is taking place, due to the exhaustion of workable deposits. The annual export is now valued at from £½m. to £⅝m. In 1916, 66 per cent. of the total export was supplied by Auckland, 20 per cent. by the West Coast (Westland and western Nelson), and 11 per cent. by Otago and Southland. The chief gold-exporting ports are Auckland and Wellington. The gold is sent to India, United States, and Australia. Among Australian States New Zealand is excelled in gold production by Western Australia only.

(*b*) Silver

Silver forms part of the ore from which gold is obtained in the Hauraki goldfield. Indeed, there is three or four times as much silver as gold present. Its value is, however, much less. The total amount of silver so far produced in New Zealand is valued at £2⅘m.

(*c*) Coal

Coal-mining affords occupation for 5,000 persons of whom only 3,600 are miners. Coal is not only abundant in New Zealand and well distributed throughout both islands, but quite half of it is of very good quality. The best coal contains a high percentage of fixed carbon and a low percentage of water and of sulphur. That which contains a good deal of water crumbles rapidly when exposed to the air. There are many grades of coal in the world, and New Zealand furnishes examples of most of them. The chief grades of our coal are: (1) Semi-anthracitic coals; (2) bituminous and semi-bituminous coals; (3) glance and pitch-coals; (4) brown coals; (5) lignites. Of these, the glance-coals and the grades above them are the most valuable, as they contain over 44 per cent. of fixed carbon and less than 6 per cent. of water.

Distribution.—(1) The **Semi-anthracitic** coals in small supply occur in the Paparoa Range at a lower level than the Brunner coals referred to below. They are the nearest approach we have to the valuable smokeless coals of South Wales.

(2) The **Bituminous** coals form the bulk of our output. They are worked in the west of Nelson and in North Westland, viz., at Denniston, Coalbrookdale, Millerton, Mokihinui, Westport (Buller field); Brunner, and Greymouth. The Westport coal is used for steam, household, gas, and smithy purposes. It belongs to the class of coal used by British warships. The Brunner or Grey coal is used for general purposes and in the manufacture of coke. The chief mines of this field are at Brunnerton, Blackball, Dobson, Rewanui, Liverpool, and the James colliery at Nine Mile. The two last named are State collieries.

(3) The **Glance** and **Pitch coals** are more or less bright and friable and do not form coke when heated in a closed chamber. In the North Island they include the coals of North Auckland, viz., Whangarei, Hikurangi, Ngunguru (at Kiripaka), and the Mokau coals. In the South Island they are found in the Inangahua

Valley (Reefton), and the Pakawau, Puponga, and West Haven (Collingwood) coalfields. These coals generally contain a high percentage of sulphur, though the best grades are largely used for steam-raising and domestic purposes.

(4) **Brown Coals.**—These are the most abundant in the Dominion. They are found in the North Island in the Waikato basin, viz., the Huntly, Taupiri, Pukemiro, Rotowaro, and Waipa collieries; and in the South Island in the Green Island, Shag Point, and Kaitangata, Castle Hill and Taratu fields of Otago, the Nightcaps district of Southland, and the Homebush (Malvern Hills) and Mt. Somers districts of Canterbury. The Avoca mine at Broken River, Canterbury, yields a superior brown coal.

(5) The **Lignites** are the poorest grade of coal, the kind which most nearly resembles wood. Deposits are found in Central Otago at Roxburgh (Coal Creek), Alexandra, Clyde, and Bannockburn (Cromwell), and in Southland in the Valley of the Mataura River at Gore, East Gore, and Wyndham. Having no forests, Central Otago depends entirely upon these coal deposits for her fuel supply. Without them the settlement of the district would have been very slow and the existence of the gold-dredging industry an impossibility.

Output and Trade.—Under normal conditions the annual output should depend upon the demand for it. This is governed by the population of the country, the amount of capital being applied to manufactures and shipping, and the absence of any complete substitute for this fuel. In spite of the increasing use of oil-fuel by steamers, and of electricity for lighting and power, every year the demand for coal increases. The output, however, which a few years ago exceeded 2m. tons, has since 1916 continued to decline, until in 1923 it amounted to 1·9m. tons. There is, however, no lack of coal, as it is reckoned that with reasonable care we have sufficient coal to last us for at least a century.

The decline has been due to industrial difficulties, evidenced by lack of miners, by strikes, lock-outs, and the adoption of the "go-slow" policy.

Ninety-five per cent. of our coal is used within the Dominion. Of the remaining 5 per cent., which is exported, two-thirds is bunker coal, so that only a small fraction is exported for other than shipping purposes. This goes to Australia and Pacific Islands.

For many years there has been a small import of coal, chiefly from Australia (Newcastle).* The deficiency in local output has been made up by imports from Australia, the United States, Canada, Japan, and even Wales. In recent years the amount has varied from ·3m. tons to over ·8m. tons in 1921, the latter figure constituting a record. In 1923 445,000 tons of coal were imported, chiefly from Australia.

3.—PRODUCTS AND INDUSTRIES ACCORDING TO LOCALITY.

AUCKLAND.

Products.—The chief products of Auckland are: **Timber, wool, gold, coal, dairy produce, frozen meat, tallow, flax fibre, kauri gum, maize, wheat,** and **fish.**

Industries.—The principal industries are: The **timber industry, mining, agriculture, sheep and dairy farming, meat freezing, flax dressing, fruit growing,** and **kauri gum digging.** To these may be added manufacture of **lime** and **cement,** and of **woollens,** sugar-refining, **iron-smelting, stone-quarrying,** and **ship-building.**

Timber.—Auckland is a well-wooded country as its climate is warm and moist and distinctly favourable to forest growth. The most valuable timber is that of the kauri pine, which grows principally in Auckland Peninsula from Ahipara Bay to Kawhia Harbour. It is largely used for making furniture and for ship-building, and is found in no other part of the world. To prevent its complete extinction the Government has set apart kauri reserves, *e.g.*, at Waipoua Forest near Hokianga.

*See pp. 190 and 199.

Other well-known kauri forests are Puhipuhi, 20 miles north of Whangarei, and Mangatu, near Kaihu, Northern Wairoa. Besides kauri timber, Auckland produces large quantities of totara, white pine (kahikatea), red pine (rimu), as well as tawa, beech and puriri. Numbers of bush sawmills (111 in 1924-5) and woodware factories are in operation. More than half the total output of the Dominion comes from Auckland mills.

Gold.—The goldfields of the province, though small in area, yield rich returns. They are situated in the Coromandel Peninsula and the Thames basin; the principal gold-mining towns being **Coromandel, Waihi, Paeroa, Komata,** and **Waiotahi.** Recent development works are at Waikino, Maratoto, and Te Puke. The gold is obtained by crushing quartz, the yield varying from one to three ounces to the ton. **Silver** is also obtained from the ore. A small **quicksilver** mine was opened in 1917 at **Puhipuhi,** but no work was done in 1923.

Coal.—Excellent coal is obtained at **Hikurangi, Kamo,** and in the Waikato District at **Huntly** (Rotowaro, Pukemiro), and Taupiri. The Waikato field now ranks second in output in the Dominion.

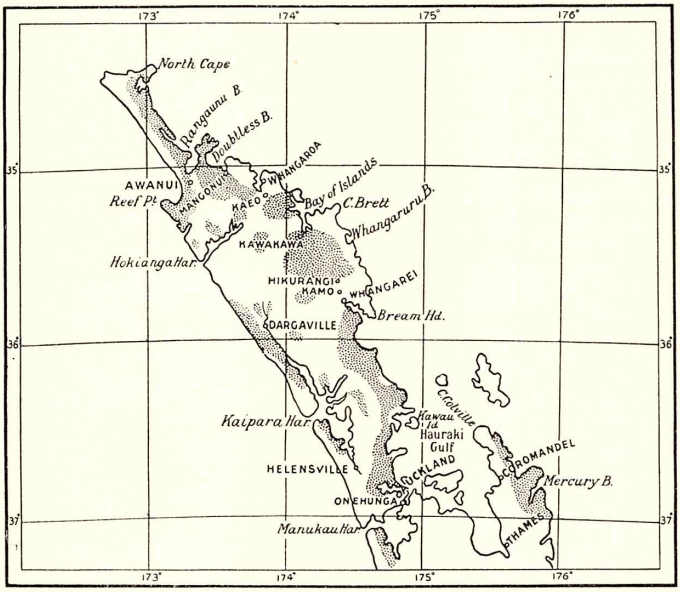
Kauri Gum.—Kauri gum consists of the solidified sap of the kauri tree. The largest quantity has been dug out of the ground in places that are now bare of forest growth, but where extensive kauri forests must once have flourished. It is also obtained from the tree when cut, the gum oozing from the wound on the stump and hardening where it collects. The kind of gum thus obtained is of a whitish colour, and is not so valuable as the beautiful amber-coloured substance that is dug out of the ground. The ground is first probed with a spear to ascertain where the pieces of gum are, and the surrounding earth is then removed with a spade. The gum is largely used in making varnish and linoleum, much of it being exported to the United States, and the rest to the United Kingdom, Canada, and Australia. Ornaments are also made from it.

About two-thirds of the total amount produced now consists of low grade or small gums, including chips and dust. The process employed consists of washing and riddling the gum soils to recover the gum they contain. A new method, called the salt vacuum process, is employed in separating the dirt from the small gums. Oil is also extracted from the kauri-peat soils and afterwards refined. The latter works are at Kaimaumau, in Mangonui County.

The gum-digging industry declined greatly during the war, but during 1923, 6,598 tons, valued at £596,222, was exported.

Sulphur is obtained from White Island, in the Bay of Plenty, and near Rotorua and Lake Taupo in the Thermal Springs District.

Sheep and Dairy Farming and Agriculture.—Auckland is not quite so well suited for sheep-farming as other parts of the Dominion, good natural grass being comparatively scarce. The number of sheep has decreased from 3¼ million in 1910 to 1½ million in 1924. On the other hand dairy-farming and cattle raising have made remarkable progress, Auckland having in 1924 64 butter-factories and 46 cheese-factories; also 6 with



After "New Zealand Journal of Agriculture."

Map of Kauri Gum Areas (shaded).

dual plant. Owing to the considerable extent of undeveloped bush and swamp land this industry is capable of still greater expansion. The latest development is in the manufacture of dried milk ("Glaxo"), there now being factories at **Bunnythorpe, Te Aroha West, Matangi,** and **Matamata,** all in the Waikato district, making this product. Casein factories are located at **Aramoho, Frankton Junction,** and **Te Aroha West.** There are meat-freezing works at **Moerewa, Southdown, Horotiu, Westfield** (two), **Whakatane, Tokomaru Bay, Hicks Bay, Waipaoa, Gisborne** and **Kaiti. Wheat** is grown, though the climate is more favourable to the growth of **maize,** especially on the Bay of Plenty (Tauranga, Whakatane, and Opotiki), while **fruit-growing** is becoming an important industry, the chief

crops being oranges, lemons, and limes (citrus fruits), olives, and grapes. These grow well on the land that has been cleared of kauri forest. There are several factories engaged in **canning fruit**, especially peaches, apricots, apples, and plums. Auckland has by far the largest area of orchard and vineyard in the Dominion (8,000 acres in 1923-24). **Tobacco growing** has been tried, but has met with poor success. The Maoris grow tobacco for their own use.

Building-stone.—Excellent stone for building, called Coromandel granite, is being quarried near Cabbage Bay. Other stones are Whangarei limestone and Raglan freestone. Large limestone deposits have led to the establishment of Portland cement works at Warkworth and Whangarei.

Sea-Fisheries.—Sea-trawling employs several hundred men, the hauls consisting chiefly of **schnapper, mullet, and flounders.** Rock-oysters are abundant on both coasts. The canning of mullet is a thriving industry. Toheroa, a very large bivalve peculiar to the West Coast, is also tinned for export. Whaling is being carried on in the north (Whangamumu).

Manufactures.—Auckland leads the Dominion in **flax-dressing**; there were 25 mills at work in 1925. **Woollens** are manufactured at Onehunga, while **ship-building** and **sugar-refining** (Chelsea) are carried on at Auckland. Rope-making, soap-boiling, candle-making, manufacture of boots, and tanning, are among the minor industries.

HAWKE'S BAY.

Products.—A large area of Hawke's Bay was open country in native grass when the first settlers came. The land is specially adapted for sheep-farming, and now has large areas sown in English grasses. Its principal products are **wool, frozen meat, butter** and **cheese**, and **timber.**

Industries.—The chief industries of Hawke's Bay are those connected with **sheep farming, dairying, fruit-growing**, and the **timber trade.**

Timber.—The Seventy-Mile Bush in the southern part of the province has now been cleared of its excellent native timber. Saw-milling is still carried on at 14 bush mills, located in the western ranges; the timber is chiefly rimu and totara.

Sheep-Farming and Agriculture,—In 1924 there were nearly 3 million of sheep in the Hawke's Bay Land District. Large quantities of wool are exported, nearly all to London. **Meat-freezing** works are in operation at **Wairoa, Westshore** (Napier), **Tomoana, Whakatu**, and **Paki-Paki. Fellmongeries**, and **soap**

and **candle works, boot factories, rope** and **twine works, sash** and **door works**, are also established. Now that the country is well opened up by roads and railways, agriculture is becoming of increasing importance. The use of artesian wells renders the Ahuriri plain and other districts easily irrigated.

Dairy Farming.—In 1923-24 Hawke's Bay (land district) had 11 butter and 16 cheese factories, and 3 with dual plant.

Fruit-growing is an expanding industry both on the poorer but warmer hill country, *e.g.*, slopes of Havelock North, and on the rich plains. **Hastings** is the centre of this industry. Wine is made from the grapes grown.

Flax-dressing has greatly declined in the district, there being but 1 mill in 1925, and the gathering of **fungus** also forms a minor industry. The fungus grows on decayed timber in the damp localities of new bush settlements, and when gathered it is dried and exported, principally to China. It is used by the Chinese for mixing with food, in soup making, and for medicinal purposes.

Fisheries.—Sea-trawling is actively pursued in Hawke Bay.

TARANAKI.

Products.—The chief products of Taranaki are **wool, frozen meat, tallow, dairy produce**, and **timber**.

Industries.—The principal industries are **dairy-farming, sheep-farming, agriculture**, and **saw-milling**. The **petroleum industry** is not yet a success.

Sheep-Farming and Agriculture.—**Meat Preserving Works** are in operation at **Patea**, and **meat-freezing** is carried on at **Smart Road, Waitara, Eltham**, and **Patea**. **Tallow** and **hides** form valuable factory and farm products. Taranaki seems so specially adapted for the dairying industry that it has been called the Denmark of New Zealand. In 1923-24 there were 18 butter and 79 cheese factories and 34 dual plant, besides a large number of skimming stations.

Timber.—A great part of east and north Taranaki is still covered with valuable forests, and **saw-milling** is carried on at 5 bush mills. The timber is chiefly rimu, kahikatea, and totara. Quantities of **fungus** are also gathered and exported.

Minerals.—Coal is mined in the northern part of the Province at the **Mokau coal-mines**. Very rich **iron sand** deposits occur for 130 miles along the coast from Mokau to Patea. Experiments have proved that it makes good pig iron and steel, but a company formed for smelting the sand in 1917 failed to pay its way. Its furnace was afterwards removed to Onakaka, Golden Bay.

WELLINGTON.

Products.—The provincial district of Wellington produces **wool, grain, frozen** and **preserved meats, tallow, timber, flax-fibre,** and **dairy produce.** There are no minerals of importance.

Industries.—The principal industries are those in connection with **sheep-farming, agriculture, flax-dressing,** and the **timber trade.**

Timber.—Wellington Province was once almost covered with forest, and even now has nearly two million acres under bush. The chief remaining forests are the Waimarino, to the west of Mt. Tongariro, opened up by the Main Trunk Railway, several large areas in the basins of the Wanganui, Wangaehu, Turakina and Rangitikei, tracts on both the western and eastern slopes of the Tararua Range, the latter including the remains of the Forty-Mile Bush, and an area of totara near Lake Taupo. One-third of Wellington's timber is rimu, the remainder matai, tawa, kahikatea, totara, maire, etc.; **saw-milling** is a prominent industry in the Manawatu and other river basins, and from Taihape (Awarua Forest) to the northern boundary of the Province. There were 55 bush mills in 1924-25. Woodware factories are established in all the larger centres of population.

Sheep-Farming and Agriculture.—Wellington is now the principal sheep-breeding district in the Dominion. **Meat-freezing works** are in operation in or around **Wellington, Petone, Palmerston North, Waingawa, Feilding** (Aorangi), **Wanganui** (Imlay and Castlecliff), **Longburn, Winiata,** and **Kakariki. Grain** and other agricultural produce are extensively grown on the **Wairarapa Plain,** and in the **Wanganui** and **Patea districts.**

Dairy-farming is largely carried on in the Wairarapa Valley, and has succeeded saw-milling in the Forty-Mile Bush, and in the west from Palmerston North to Waverley. In 1923-24 there were 16 butter and 54 cheese factories, and 11 dual plants.

Manufactures.—Flax-dressing is extensively carried on in Wellington; there were 24 flax-mills at work in 1924-25. The district around Foxton, particularly, produces large quantities of fibre. **Woollens** are manufactured at **Petone,** and at **Wanganui,** while **iron** and **brass foundries, fellmongeries, soap** and **candle works, boot factories, brick, tile,** and **pottery works, rope** and **twine works, match** and **box factories** are established in various places.

MARLBOROUGH.

Products.—The chief products of Marlborough are **wool, timber, frozen meat, flour, dairy produce,** tallow, **fruit, fish,** and **flax fibre.**

Industries.—The principal industries are **sheep-farming, dairy-farming, saw-milling, hop growing, fruit growing, fisheries,** and **flax-dressing.**

Marlborough being a rugged, mountainous and well-timbered country, the principal industries are sheep-farming and the timber trade. Gold is found now in very small quantities in the Wakamarina and Wairau Valleys, and at Mahakipawa; and scheelite from a mine at Wakamarina Valley was a valuable product in later war years. Dairy-farming is a growing industry. The crops grown are chiefly oats, barley, and peas, while lucerne cultivation for early feed, hay, and seed is rapidly becoming general.

These industries have drawn the chief population to the Wairau Plains and the shores of the Sounds. Two-thirds of the timber is rimu, the remainder being kahikatea, matai, beech, etc. There are 17 timber mills. Flax-milling is a minor industry, the fibre being of good quality; 3 mills were in operation in 1924-25. Flour-milling is carried on at **Spring Creek** and **Blenheim,** while at **Picton** there is a meat-freezing works. There are 4 creameries and 4 cheese factories in the province; 3 dual plant. The fisheries are located in and near the Sounds.

NELSON.

Products.—The principal products of Nelson are **coal, gold, wool, timber, grain, hops, dairy produce, flax fibre, fruit.**

Industries.—The principal industries are those in connection with **coal** and **gold-mining, sheep-farming,** the **timber-trade, fruit-growing,** and **agriculture.**

Sheep-farming and **agriculture** are carried on in the Tasman Bay and Waimea Plains districts, and in the south-eastern corner of the province. There is a meat-freezing works at **Stoke. Hops** are largely grown in the Waimea County around Tasman Bay and at Takaka.

Timber.—Being very mountainous, Nelson is still largely covered by forest, though much of the timber cannot be got at by millers. There were 36 bush mills working in 1924-25. Four-fifths of the timber is beech, but other kinds occur, including rimu (now scarce) and kahikatea. The best remaining rimu

forests are at **Karamea** and **Cape Farewell**, and smaller areas in parts of the **Buller Valley**.

Dairy-farming.—There are now 6 creameries and 4 cheese factories; 1 dual plant. Among the leading factories are those at **Brightwater, Takaka, Karamea**, and **Murchison** for butter, and at **Rockville** for cheese.

Fruit-growing is largely carried on in the district surrounding the town of Nelson. The district ranks next to the two Auckland districts in area planted in orchards. Peaches, apricots, plums and raspberries have been grown with success for many years, while the growing of apples for export is rapidly coming into favour. **Fruit-canning** and preserving are done at Motueka, Riwaka, and Nelson.

Flax-milling.—There were 7 mills at work in the province in 1924-25.

Coal—The **Puponga** field is near Cape Farewell. The largest and most valuable coal-mines in the Dominion occur in the neighbourhood of **Westport**. The famous **Coalbrookdale** coal comes from mines at Millerton and Denniston. The coal is probably one of the best steam coals in the world. To the north of the latter lies the **Westport-Stockton** (Mangatina) mine. There is a rich outcrop of coal at the Buller Gorge, which will be developed when the railway to Westport is completed. **Reefton** coal, while inferior to Westport, is good household fuel.

Gold.—The rich gold-bearing valleys of the **Buller** and the **Grey** support a large mining population. The Reefton field, discovered in 1872, has been perhaps the richest on the coast. It is now of minor importance. Gold is obtained by quartz-mining and by sluicing, *e.g.*, at **Lyell** and **Ahaura**, and quartz is mined at **Blackwater** and **Murray Creek**. Gold is also produced in and around **Collingwood**, where there are also deposits of silver, copper, iron, etc.

Iron.—At **Onakaka**, Golden Bay, a company is engaged in working valuable iron-ore deposits and manufacturing pig-iron.

Building Stone.—Nelson (as well as Westland) is well provided with good granite (*e.g.*, Tonga Bay), and limestones. Golden Bay cement is made at **Tarakohe**, 8 miles from Takaka.

Manufactures.—The manufactures comprise leather, boots, soap, jam, flour, and biscuits.

CANTERBURY.

Products.—Canterbury is principally an agricultural and pastoral district. Her further progress is now retarded by the need for better access to the sea. Rival schemes to achieve this object are (1) canal and har-

bour (Port Christchurch); (2) new tunnel road for motor traffic; (3) duplicating the present tunnel and railway, and electrifying the tunnel section. The Government has undertaken to proceed with the latter project. With the completion of the Midland Railway, improved communication has been opened up with Westland, *viâ* Arthur's Pass tunnel. Canterbury's chief products are **grain, wool, frozen meat, tallow, dairy produce, hides, skins, leather, and flax.**

Chatham Islands.—The natives (Morioris) have nearly all died out. The white population, numbering 220, is engaged in sheep-farming and fishing. The chief exports are wool, sheep, and frozen fish.

Industries.—The principal industries are those in connection with **sheep-farming** and **agriculture.** The manufacture of woollens, meat-freezing, flour-milling, flax-dressing, fisheries, and tanning are important industries.

Timber.—Canterbury has more grass land and less timber than any other province. The sawmilling industry once flourished at Oxford, Little River, Mt. Somers, and Waimate. The chief timber was beech, though totara, rimu, and kahikatea were found in small quantities. There are still 7 mills, but some of these are cutting the introduced pine plantations.

Sheep-Farming and Agriculture.—The eastern slopes of the Southern Alps and the drier portions of the Plains support over four millions of sheep. Large quantities of wool and frozen meat are therefore exported. Meat-freezing works are in operation at **Kaiapoi, Belfast** (two), **Islington,** and **Hornby,** near Christchurch, at **Fairfield,** near Ashburton, and at **Smithfield** and **Pareora,** near Timaru. More wheat is grown in Canterbury than in all the rest of the Dominion put together. More barley and potatoes are also produced than in any other provincial district, as well as large quantities of oats.

Dairy Produce.—Butter and cheese are produced in all parts of the district. Akaroa cheese has long enjoyed a good name for quality and flavour. There are 12 creameries and 20 cheese factories in the province; besides 3 with dual plants.

Grass-seed is largely grown. **Cocksfoot** is the chief variety on Banks Peninsula, and **ryegrass** in other parts. The cultivation of lucerne, too, is becoming more general.

Flax-milling was carried on at 2 mills in 1924-5.

Coal.—Brown coal is mined in the Malvern Hills at the Homebush (at Glentunnel), St. Helen's, and Steventon (at

Whitecliffs), and Glenroy collieries; and also at Mount Somers. A superior brown coal is obtained at Avoca (Broken River).

Building-stone.—Good qualities of hard stone are quarried at Halswell (basalt), Governor's Bay, and Malvern Hills, limestone at Malvern Hills and Mt. Somers; also bluestone at Lyttelton. Poorer qualities of limestone are made into quicklime.

Manufactures.—Woollens are manufactured at Kaiapoi, Ashburton and Timaru. The tweeds, worsteds, rugs, and blankets of Kaiapoi are of the best quality. Woodware factories, soap and candle-making, brewing, tanning, the making of bicycles, motor-bodies, agricultural machinery, perambulator and carriage making, boot and clothing factories, and iron foundries give employment to numbers of people.

WESTLAND.

Products.—The products of Westland are **gold, coal, timber, dairy-produce** and **flax fibre. Limestone** and **marble, greenstone, building** and **lithographic stone,** as well as **pottery clays** and **fire clays** are produced.

Industries.—The principal industries are **mining,** and the **timber trade.** Until lately there has been very little agriculture or pastoral settlement: the necessaries of life have been imported, principally from Wellington. The chief obstacles to the development of the province are the want of good harbours and the difficulty of transport, though the latter is being gradually overcome.

Gold.—Westland is a vast alluvial gold field. The alluvial gold once found at Kumara was perhaps the richest in the Dominion. New ground is being worked at **Arahura Valley.** Quartz mines also occurred at Kumara. At Ross the gold is obtained by deep sinking; along the south coast it is obtained by washing the sands of the sea shore; and in various places by sluicing. Two new sluicing companies commenced operations in 1918, one at Riverview, and the other near Lake Kanieri. The output, however, is very much less than it once was. In 1918 only 7 dredges produced gold. In 1923 dredges were in successful operation at **Rimu** and **Awatuna Beach.**

Coal.—Large quantities of coal are exported from Greymouth, the bulk of which comes from the Brunner mines. The **Dobson** mine is the nearest to Canterbury on the main line. The Grey field ranks next to the Buller in value of total output. The two South Island State coal mines are **Point**

Elizabeth at Runanga, 4 miles from Greymouth, and **Liverpool** at Rewanui, 8 miles from Greymouth. The former mine is now worked out, but an extension of the seam is being developed at Nine-mile Creek (**James Colliery**), to which a branch railway has been built from Runanga, three miles away.

Timber.—The slopes of the Southern Alps being clothed with forest, the timber trade is an important industry. Four-fifths of the timber is rimu, the remainder chiefly kahikatea, totara, and silver pine. There were 54 bush sawmills at work in 1924-25.

Flax.—Three mills were in operation in 1924-25.

Cattle-rearing and dairy-farming.—Most of the settled land is used for rearing and fattening cattle and for dairying. Eight butter factories and 2 cheese factories have been established; 1 dual plant. Oats as well as grass are grown for hay.

OTAGO.

Products.—The chief products of Otago are **wool, gold, grain, frozen meat, coal, dairy produce, fruit, tallow, hides, skins, timber, flax-fibre, building stones, lime, fish.**

Industries.—The principal industries are **sheep-farming** and **agriculture, mining,** the **timber trade, dairying, tanning, iron** and **brass-founding, brewing, soap** and **candle-making, flax-dressing, paper-making.**

Timber.—Otago has only a small area in forest, most of it being in the south-east or in the high valleys in the west. The chief timber districts are at Catlins River and Tautuku, and at the heads of Lakes Wakatipu, Hawea, and Wanaka, etc. The best timber is rimu, matai, and beech. There were 24 bush mills working in 1934-25.

Dairy-farming.—The chief factories are situated in the east within easy reach of the railway, and on the rich Otago Peninsula. They are at Palmerston, Waikouaiti, Milton, Stirling, Balclutha, Portobello, etc. In Otago and Southland together there are 17 butter factories and 76 cheese factories; 2 with dual plant.

Fruit-growing.—Central Otago is one of the leading fruit-growing districts in the Dominion. At **Roxburgh,** opposite the Teviot Valley, and at other parts of the Clutha Valley, viz., **Alexandra, Clyde,** and **Cromwell,** large quantities of fruit are raised, viz. apples, pears, berries, plums, peaches, apricots, and cherries. The summer heat is sufficient to ripen grapes in the open air. With suitable irrigation almost any agricultural crop might be raised in this region. See Appendix V.

Flax-milling.—There were 6 mills at work in 1924-25.

Sheep-Farming and Agriculture.—The central hilly country and the upland plains are well adapted for depasturing sheep, and large quantities of wool and frozen meat are exported. There are meat-freezing works at **Pukeuri, Burnside,** and **Finegand.** Large quantities of wheat, oats, and barley are grown on the Oamaru Downs, and on the Taieri and Clutha Plains. Otago ranks next to Canterbury in the production of both wheat and oats.

Gold-mining.—A large part of Central Otago is an alluvial gold-field. Dredging is carried on in the bed of the Clutha River, *e.g.*, at Cromwell and Alexandria; and sluicing at Naseby, St. Bathans, Cromwell, Cardrona, Bannockburn, Nevis, and other Clutha towns. In 1923 only 6 dredges produced gold in Otago. Quartz-mining is carried on at Pukerangi, Bendigo (near Cromwell), Macetown, Waipori, along the Shotover, and at other places.

Scheelite, a product of tungsten-ore, mined at Glenorchy and Macrae's, and valuable for hardening gun-metal, was commandeered by the Imperial Government during the years 1915-18.

Coal.—Brown coal or lignite is extensively worked at Shag Point, Green Island, Kaitangata, Milton, Alexandra, and Bannockburn.

Building-stones.—Some valuable deposits are being worked. Besides the well-known Oamaru limestone there are Otekaike limestone, Port Chalmers bluestone, Kokonga sandstone, and Lake Wakatipu limestone and freestone.

Fisheries.—Otago produces abundance of fish, numbers of fishermen being employed in the harbours and along the coast. The lakes and rivers are teeming with trout.

Manufactures.—Woollen mills are established at **Roslyn** (best N.Z. knitting yarn, also tweeds, worsteds, and blankets), and at **Mosgiel, Milton,** and **Oamaru.** There are numerous important iron and brass foundries at work in the larger towns, also soap and candle factories, iron and woodware factories, boot-factories, flax-dressing and rope factories, etc. Lime works are located at **Milburn.** A paper mill is established at **Woodhaugh** (Leith Valley), a suburb of Dunedin.

SOUTHLAND.

(Including Stewart Island)

Products.—These are **wool, gold, wheat, oats, frozen meat, coal, dairy-produce, tallow, hides, skins, timber, flax-fibre, fish, lime.**

Industries.—The industries are similar to those of Otago, viz., **sheep-farming, agriculture, coal and gold**

mining, timber trade, dairying, flax-dressing, paper-milling, fishing.

Timber.—Besides extensive tussock plains suited for grazing, Southland possesses a large area of forest. Rimu and beech are the most plentiful milling timbers, while kahikatea, matai, and totara are found in fair quantity. The chief areas are at Waikawa, Seaward Bush, Longwood, and Stewart Island; 34 bush mills were at work in 1924-25. An up-to-date sawmill is in operation at Port Craig, 88 miles west of Invercargill.

Sheep-Farming and Agriculture.—There are 1¾ million sheep in the district, and wool and frozen meat are valuable products. Meat-freezing works are situated at **Ocean Beach**, the **Bluff**, **Mataura**, and **Makarewa**, while beef, mutton, and rabbit tinning works are in operation at **Woodlands**. A woollen mill is established at **Rosedale** (Invercargill), and it has been proposed to erect one at **Gore**. The chief agricultural crops are wheat, oats, barley, potatoes, and root crops. Oats thrive in a cool moist climate, and chiefly on this account Southland grows more oats than any other province except Canterbury.

Dairy-farming.—This industry is in a very prosperous condition. (See Otago.) A factory for the manufacture of condensed milk is located at **Underwood**, Invercargill, and a sugar of milk and casein factory at **Edendale**.

Coal.—Valuable brown coal is worked at **Nightcaps**, **Gore**, and **Winton**.

Oil-shale deposits occur at **Waikaia** and **Orepuki**.

Building Stone includes the granites of Ruapuke Island and Stewart Island, and the norite of the Bluff.

Gold.—Dredging is carried on in the eastern rivers, *e.g.*, at **Nokomai**, and quartz-mining at Preservation Inlet and Stewart Island. A little **platinum** is obtained from auriferous wash, and is distributed along the beaches and coastal terraces to the east and west of Invercargill.

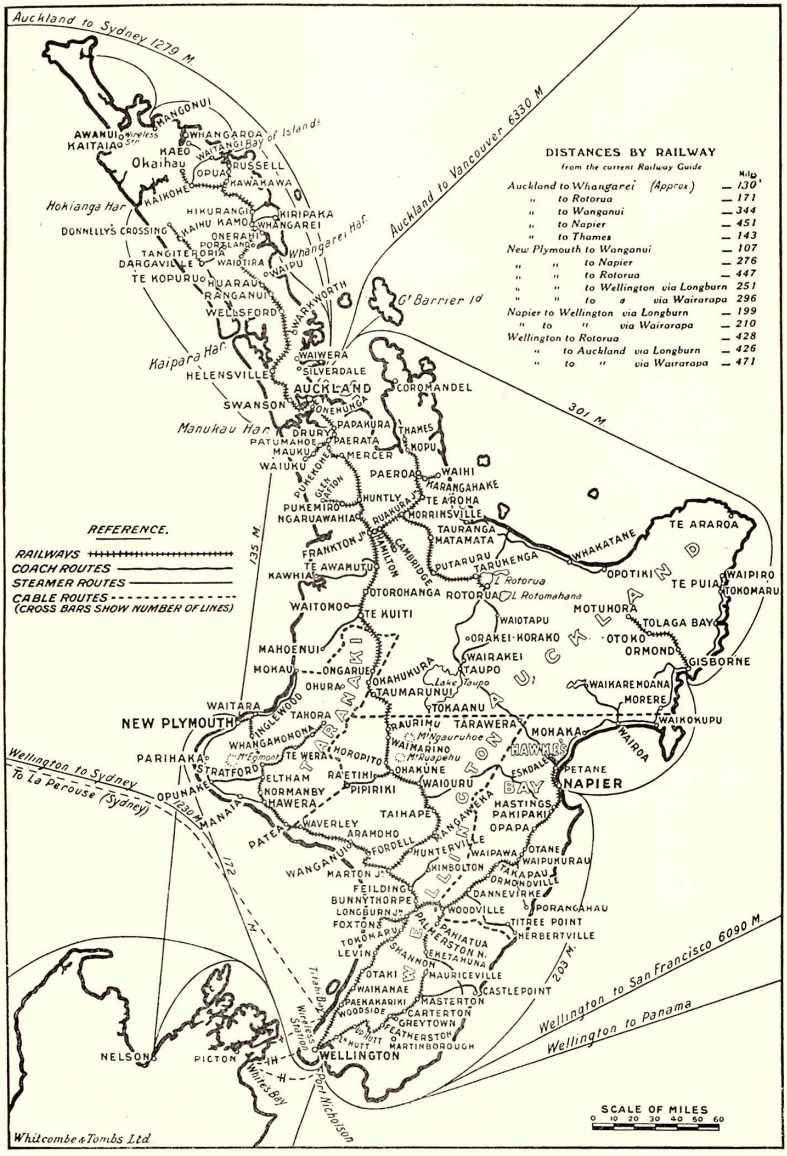
Fisheries.—The abundance of sea fish in Stewart Island waters has led to an important fishing industry and freezing works have been built at the Bluff, Stewart Island, and Preservation Inlet. Stewart Island oysters and other fish (chiefly blue cod) are exported *viâ* the Bluff to Melbourne.

Flax-milling.—The industry supported 19 mills in the district in 1924-25.

4.—TRANSPORT AND COMMUNICATION

A.—Local and Interprovincial Transport.

We have seen that the production of useful articles adds to the wealth and comfort of man. But goods have little value if they are not in the place



NORTH ISLAND

Showing the Railways, Motor routes, Shipping routes, Cables, Towns, and Tourist resorts.

where they are wanted. The transport of goods from places where they are not required for actual use or consumption to places where they are needed is an important way of increasing the wealth of man. The more quickly and cheaply this can be done, the more quickly and fully can man's wants be satisfied, and the greater is his well-being.

(1) **Roads.** — New Zealand is well supplied with means of transport for persons, letters, and merchandise. The settled portions of both islands are closely connected by a network of good macadamized roads, and most of the rivers are well bridged. The roads are worst in remote country districts, and in thinly-peopled or newly-opened parts of North Auckland, Taranaki, and Wellington — chiefly where road metal is not obtainable. Traction upon these roads is by horse vehicle, steam engine, or motor. Bullocks are now used only in remote country districts, or for log hauling. Coaches, drawn by horses, once almost the only means of travelling, are being used less and less as railways are completed and motor cars are introduced.

In accordance with the Main Highways Act, 1922, the construction and maintenance of the main arterial roads* of the Dominion have been removed from the several County Councils and entrusted to a central Main Highways Board assisted by 18 highway district councils.

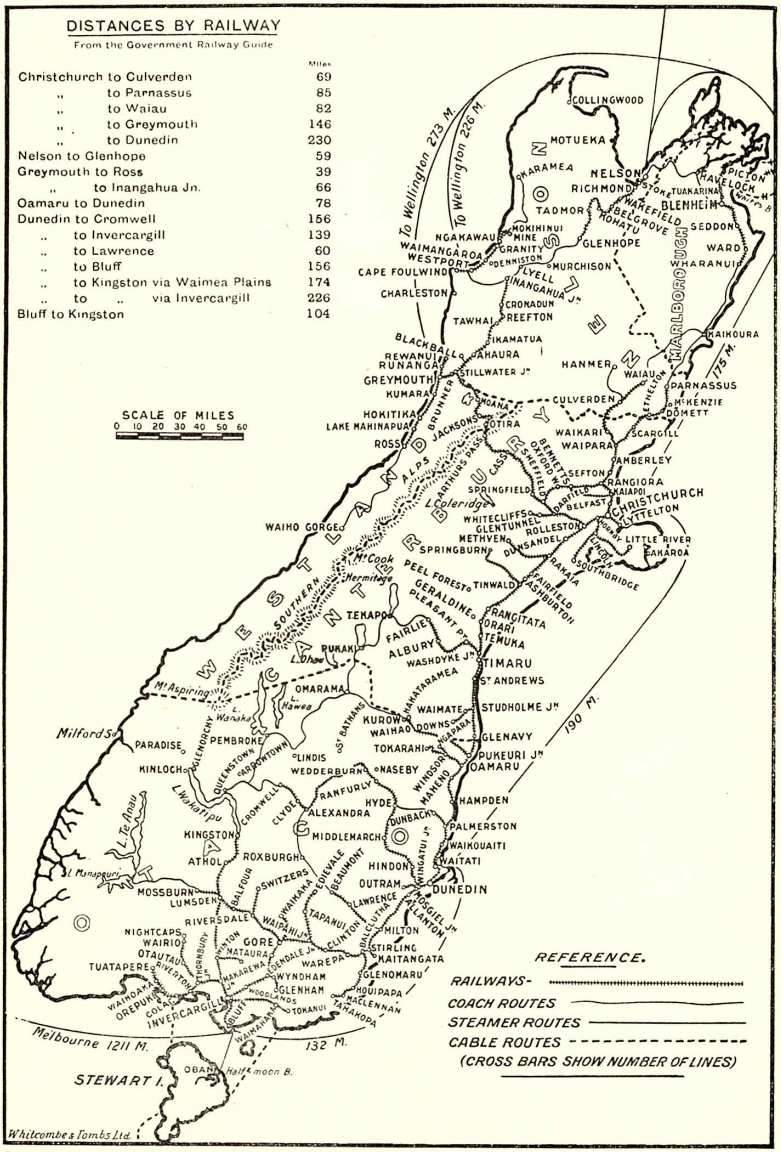
Motor Routes:—North Island:

(1) Waihi-Katikati-Tauranga-Opotiki (East Coast Trunk Railway).
(2) Tauranga-Rotorua.
(3) Opotiki-Motuhora-Gisborne.
(4) Hangatiki-Waitomo Caves.
(5) Waitara-Mokau-Te Kuiti.
(6) Waimarino-Tokaanu.
(7) Hawera and Eltham-Opunake-New Plymouth.
(8) Napier-Taupo-Rotorua.
(9) Napier-Wairoa-Waikaremoana.
(10) Napier-Gisborne.
(11) Gisborne-Tokomaru-Waipiro-Te Araroa.

South Island:

(1) Blenheim-Picton and Blenheim-Havelock-Nelson-Motueka-Takaka.

*See Appendix IV.



SOUTH ISLAND

Showing the Railways, Motor routes, Shipping routes, Cables, Towns, and Tourist resorts.

(2) Blenheim-Top House-Glenhope.
(3) Glenhope-Inangahua Junction-Westport and Reefton.
(4) Hokitika-Greymouth and Hokitika-Ross-Waiho.
(5) Waiau-Kaikoura.
(6) Culverden-Hanmer.
(7) Christchurch-Parnassus-Kaikoura-Blenheim.
(8) Christchurch-Little River-Akaroa.
(9) Timaru-Fairlie-Pukaki - The Hermitage - Omarama - Pembroke (or Cromwell)-Arrowtown-Queenstown (Summer Service).
(10) Glenorchy-Paradise.
(11) Gore and Beaumont-Roxburgh-Alexandra-Cromwell, etc.
(12) Invercargill-Otautau-Manapouri and Te Anau.
(13) Lumsden-Manapouri-Te Anau.
(14) Invercargill-Curio Bay.

(2) **Electric Tramways.**—Eight New Zealand towns have up-to-date electric tramway services. They are Auckland, New Plymouth, Napier, Wanganui, Wellington, Christchurch, Dunedin, and Invercargill. The same machinery also supplies electricity for lighting, heating, and power purposes.

Palmerston North and Timaru have motor 'bus services.

(3) **Railways.**—In all lands, railways for the most part follow the route that is easiest and cheapest for construction and running. As a rule, this is over the lowlands and along river valleys—localities best suited for the abode of man. Hence in New Zealand the trunk lines follow the coast. The portions furthest from the sea are the central sections of the North Island Main Trunk which skirts the western fringe of the Volcanic Plateau, and the Wellington-Napier line which follows the depression lying to the east of the Main Divide of the North Island. The Midland Railway* connecting Canterbury and Westland runs *viâ* the Waimakariri (Bealey) and Otira river valleys. The Otago Central, too, follows the valley of the Taieri, and the Invercargill-Kingston line that of the Oreti, while a portion of the Main Trunk is cut out of the steep cliffs along the Rangitikei and its tributary the Hautapu. Some of the more noteworthy triumphs of railway engineering in New Zealand are the numerous tunnels (including Lyttelton tunnel, 1½ miles; the Otira or

*Opened for through traffic in 1923. There are 15 tunnels in the Canterbury section of this line.

Arthur's Pass tunnel, 5⅛ miles*; thirty-six tunnels in the North Island Main Trunk Railway); the Rimutaka Incline, a steep line leading from Wellington over the Rimutaka Range (1,144ft.) into the Wairarapa Valley; several viaducts† on the Main Trunk line; and the Raurimu Spiral between Raurimu and Waimarino, which includes in its winding course a complete circle of lines. From Raurimu on the Wanganui the line climbs 700ft. to the Waimarino Plain (see page 28), which lies west of Waimarino and Raetihi. This ascent is made in about two miles, and leads to the highest portion of the Main Trunk line lying between Waimarino (2,636ft.), and Waiouru (2,660ft.). There were 3,053 miles of railway open to traffic in 1924.

Of projected lines, and lines in course of construction, the most important are the East Coast Railway from Waihi *viâ* Tauranga,‡ Opotiki, Gisborne to Napier; the Western Taranaki from Te Roti and Stratford *viâ* Opunake to New Plymouth; from Putaruru to Taupo; from Tahora to the Main Trunk line at Okahukura; Parnassus *viâ* Kaikoura to Wharanui (that is, the completion of the South Island Trunk line); Westport to Inangahua Junction and Glenhope.

The utility of railways to New Zealand is very great. The first railways followed settlement; now, to a large extent, settlement follows wherever they are laid; for they are constructed to develop rich unoccupied lands. The railways are the chief internal distributing agent, for they not only carry produce to the seaports for export, but carry inland the commodities that come from abroad. They tend to scatter rather than to concentrate population. The ease and convenience of railway travelling lead to a large passenger traffic throughout the Dominion. Still, the system is not without its disadvantages. The lines are expensive to construct and

*Seventh longest tunnel in the world. The highest point in the tunnel is 2,437 ft. above sea-level. The tunnelled section of the railway, 8·6 miles long, is electrified.

†Makohine (length 850 ft., height 238 ft.) Makatote (length 864 ft., height 257 ft.) and Hapuawhenua.

‡A service, Tauranga-Awakeri, 51 miles in length, is at present (1925) being run by the Public Works Department. The Tauranga Harbour railway bridge measures 1,470 ft.

operate. Then they are long and spidery and not continuous and so are incomplete. Lastly, the narrow gauge (3ft. 6in.), by limiting the size of trucks and the speed of trains, may in the future prove a serious obstacle to progress. During recent years the State railways have suffered from the competition of motor vehicles, and steps are now being taken to meet this development.

(4) **Steamers.**—Most of the interprovincial trade of New Zealand is in the hands of (*a*) the Union Steam Ship Company, (*b*) the Huddart Parker Company, and (*c*) the Northern Steamship Company. Coastal trade is also carried on by a number of small vessels belonging to smaller companies and private owners.

(*a*) **The Union Steam Ship Company of New Zealand** runs coastal passenger services as follow:—

(1) Between Wellington and Lyttelton (Ferry Service) (175 miles) daily excepting Sundays.

(2) Between the chief ports of the Dominion, viz., Wellington-Picton; Wellington-Westport; New Plymouth-Onehunga (jointly with the Northern Steamship Company); Auckland-Gisborne-Napier, and *vice versa.*

(*b*) The **Huddart Parker Company** has one steamer which visits Wellington and Auckland as part of the intercolonial service explained on pages 115, 116, and 120.

(*c*) **The Northern Steamship Company**, whose headquarters are at Auckland, has a large coastal trade. At regular intervals, steamers visit all the northern ports of the Dominion from Wanganui on the west to Opotiki on the east. The most frequent of these services are:—Between Auckland and Russell, Bay of Islands, Whangarei, Paeroa, Thames, Coromandel, Warkworth, Tauranga, and Silverdale. Steamers run twice a week both ways between Onehunga and New Plymouth.

(*d*) The **Anchor Line** (with headquarters at Nelson) maintains a daily service between Wellington and Nelson and *vice versa.*

(5) **Aviation**, as a means of transport, is yet in its infancy. State flying schools are in operation at Kohimarama, Auckland, and at Sockburn, North Canterbury.

B.—Foreign Transport

A New Zealander wishing to go to Europe has a choice of five distinct routes, viz., (1) from Auckland *viâ* **Vancouver** (Canadian-Australasian Royal Mail Line); (2) from Wellington *viâ* **San Francisco** (Union Royal Mail Service) (the two quickest*); (3) from Wellington *viâ* **Panama** (N.Z. Shipping Company and Shaw Savill and Albion Lines); (4) from Wellington or Auckland to Sydney or Melbourne by Union Company or Huddart Parker, and thence by a vessel of any of the lines following the **Suez route,** viz., the P. and O., the Orient, Messageries Maritime, and the Federal Steam Navigation Co. Lines; (5) from Wellington or Auckland to Sydney or Melbourne by Union Company or Huddart Parker, and thence by a vessel of the Blue Funnel, White Star, Aberdeen or Blue Anchor lines, following the route *viâ* **Durban** and **Cape Town.** All the Suez lines use almost the same ports of call, except that the P. & O. boats call at Brindisi and the Orient at Toulon, and the terminus of the French Line is Marseilles. Mails from the eastern states of Australia are despatched by rail to catch these vessels at Fremantle. A possible variation in route from Australia is by the Oceanic Line to San Francisco.

The earliest routes from Europe to Australasia were either by way of Cape of Good Hope or by way of Cape Horn. An alternative route was added in 1869 on the opening of the Suez Canal. The direct service between New Zealand and England, viz., Home *viâ* Cape Horn and out *viâ* Cape Town, ceased towards the close of 1914. Since early in 1915, save for brief interruptions, the Panama Canal route has become the regular channel for trade between England and New Zealand. Almost the whole of New Zealand's direct export trade to England and her direct imports from England, Eastern Canada, and United States of America, now pass through the Panama Canal. It was not so much the slight saving in time and distance (600 miles)

*Owing to the high speed of American railways and of the Atlantic liners.

which brought this about as the impossibility of obtaining Welsh bunker coal at South American ports during the war, and the good coaling facilities provided at Newport News in United States of America.

Our foreign transport is in the hands of several large steamship companies, viz.:—

(1) **The Union Steam Ship Company of New Zealand Ltd.** has a fleet of about 80 ships, and runs regular passenger and cargo services as follows:—

TO AND FROM AUSTRALIA (in conjunction with **Messrs. Huddart Parker and Co.**, who now employ only one steamer):—

Melbourne-New Zealand (Three-weekly Service):—

(*a*) By Union Steam Ship Company, whose steamers leave Melbourne at intervals of about 10 days for New Zealand *viâ* Bluff and Wellington. Average time from Wellington to Melbourne is about 5 days, and Bluff to Melbourne about 4 days. Suspended for winter running, when a steamer once in 16 days or thereabouts maintains the service.

Sydney-Auckland (average time 4 days):—

(*a*) By Union Steam Ship Company from Sydney for Auckland and back.

(*b*) By Huddart Parker Ltd. from Sydney to Auckland and back.

Sydney-Cook Strait-Wellington:—

(*a*) By Union Steam Ship Company—two steamers each way.

(*b*) By Huddart Parker Ltd.—one steamer Sydney to Wellington and return. Average time from Wellington to Sydney is 4 days.

Sydney to Bluff, etc.:—

(*a*) By U.S.S. Company steamer fortnightly with cargo only from Sydney to Bluff, Dunedin, and Lyttelton, and *vice versâ*.

The two companies maintain a weekly service between New Zealand and Sydney, leaving Wellington or Auckland on Fridays.

From Sydney for either Auckland or Wellington the Union Line steamers leave on Fridays and the Huddart Parker steamer on Saturdays.

SOUTH SEA ISLANDS (Monthly):—

(*a*) Auckland to Suva (Fiji) direct.

(*b*) Auckland to Suva (Fiji), Tongan Group (Nukualofa, Haapai and Vavau), Apia (Samoa), and return to Suva and Auckland. Can usually connect with small steamer (Burns, Philp Line) Suva to Sydney, running about every 28 days.

(*c*) Auckland to Rarotonga (Cook Islands) and Papeete (Tahiti) and return, cargo service only.

TO AND FROM AMERICA:—

(*a*) **The Canadian-Australasian Royal Mail Line,** whose route is *viâ* Sydney, Auckland, Suva (Fiji), Honolulu, Victoria, and Vancouver, where connection is made with the Canadian-Pacific Railway and Canadian National Railway. Mails and passengers for Home cross Canada (or the United States) by rail, and leave Halifax, Montreal, or New York for the United Kingdom. This is known as the "All Red Route." The journey from Auckland across the Pacific occupies eighteen days, and the whole journey to England thirty to thirty-five days.

(*b*) **The Union Royal Mail Service.** The route is Sydney, Wellington, Rarotonga, Papeete, San Francisco. From the latter port passengers and mails travel to England *viâ* Union or Southern Pacific or other U.S.A. railway to New York, and thence take a trans-Atlantic steamer for Southampton or Liverpool. The journey across the Pacific occupies eighteen* days, and the whole journey to England (12,000 miles) from thirty to thirty-seven days.

All passenger vessels on both the above lines are now oil-burners.

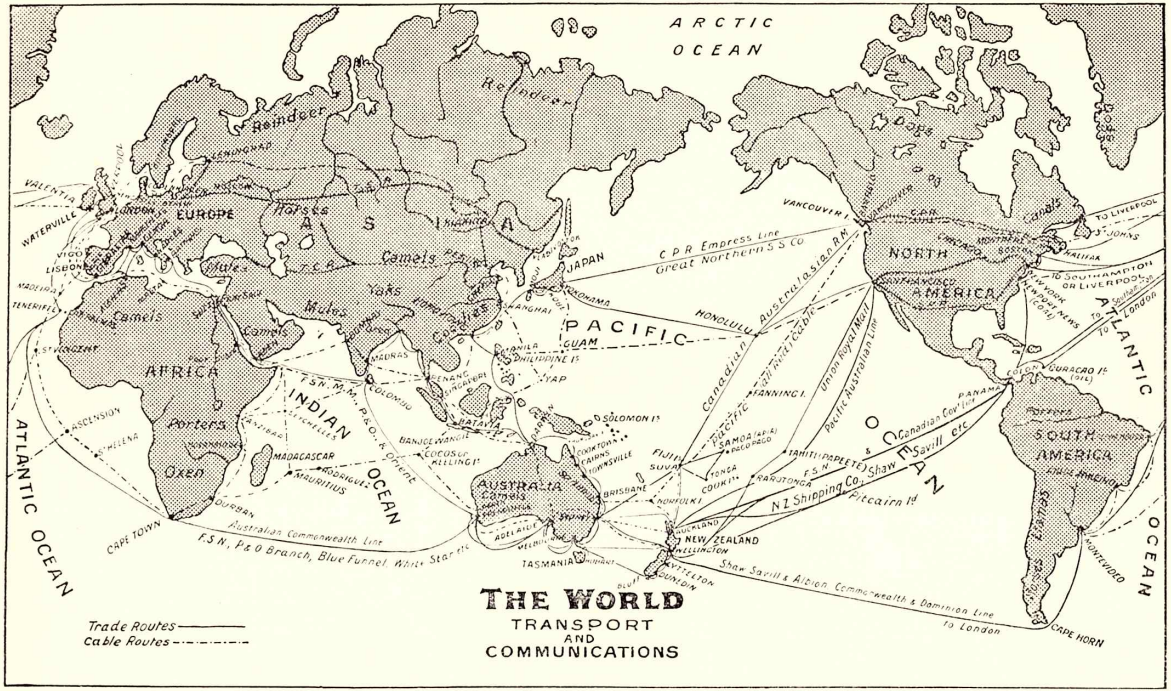
In addition to the above there are regular **cargo services** between New Zealand ports and Vancouver, San Francisco, and Calcutta. The latter service is *viâ* Sydney, Java and Singapore.

(2) **The Huddart Parker Ltd.** has now only one one steamer trading between New Zealand and Australia as stated above. It carries passengers, cargo, and mails.

(3) **The New Zealand Shipping Company.**—This company maintains the following services, *viâ* Panama Canal:—

(*a*) The Direct Service from New Zealand to the United Kingdom. Regular sailings of steamers carrying passengers, cargo and mails, *viâ* Cristobal (adjoining Colon), Curacao (oil burners only), and Newport News, U.S.A. (coal burners only) to Southampton and London. The main ports in New Zealand are visited regularly to discharge and load cargo, and at varying intervals practically all other ports in New Zealand with the exception of those on the West Coast of the South Island.

*Record time 16½ days.



Trade and Cable Routes to and from Australia and New Zealand.

The distance from London to Auckland by this route is about 11,500 miles, and the journey, including stoppages, takes from 35 to 42 days.

(*b*) The Eastern Canadian Service.—The New Zealand Shipping Company maintains a monthly service of cargo steamers between Eastern Canada and Australasia. The vessels leave Montreal or St. John, and touch at Newport News and Colon, Auckland, Wellington, Lyttelton, Timaru and Dunedin, also at Melbourne and Sydney. The journey to Auckland occupies about 32 days. The service is purely a cargo service, and no passengers are carried.

(4) **The Shaw Savill and Albion Company Limited** has a fleet of passenger and cargo steamers trading between New Zealand and the United Kingdom.

The passenger steamers sail from Wellington, New Zealand, at about three-weekly intervals, and during the season proceed through the Panama Canal and arrive at Southampton about six weeks after leaving Wellington. In the off season, the route taken is *viâ* Cape Horn, calling at Monte Video and Teneriffe. The cargo steamers usually take the Cape Horn route Homewards, calling at Monte Video, but occasionally some go through the Panama Canal to make a call at New York and Boston.

Mails are carried by the passenger steamers, and very often by cargo steamers.

The distances are: Wellington to Balboa 6,500 miles, through the Panama Canal to Colon 44 miles, thence to the United Kingdom, usually Southampton and London, 4,600 miles, total distance 11,144 miles. The distance *viâ* Cape Horn to London is 12,272 miles.

(5) **Cunard Line.**—The Australasian service of this Company, which is called the **Commonwealth and Dominion Line,** runs the following services to New Zealand from the United Kingdom and New York, carrying general cargo, a limited number of first-class passengers, and occasionally parcel mail:—

1. New Zealand to London *viâ* Monte Video (three-weekly service).

2. London to New Zealand ports *viâ* Panama Canal (two-monthly service). Passage, 39 days.

3. Glasgow and Liverpool to New Zealand ports *viâ* Panama Canal (twice yearly). Passage, 39 days. Distance, Liverpool to Auckland, 11,100 miles.

4. Middlesbrough, Hull and London to Australian ports *viâ* Cape of Good Hope (fortnightly despatches). Passage occupying 40 days. Distance, London to Fremantle, 10,800 miles.

5. Australian ports to various Continental and U.K. ports and London *viâ* Suez Canal (three-weekly service). Passage to first port, 35 days.

6. New York to New Zealand ports *viâ* Panama Canal (six-weekly service). Passage, 30 days. Distance, New York to Auckland, 8,600 miles.

7. New York to Australian ports: Brisbane, Sydney, Melbourne, and Adelaide, *viâ* Panama Canal (monthly service); passage to first port occupying 33 days.

8. New York to Fremantle and other Australian ports *viâ* Cape of Good Hope (six-weekly service).

(6) **The Federal Steam Navigation Co. Limited** maintains several services:—

(*a*) New Zealand to West Coast U.K. ports. Once a month ships sail from New Zealand (Wellington, Auckland, or Lyttelton) *viâ* Panama to west coast United Kingdom ports, viz., Avonmouth, Liverpool, Manchester, and Glasgow, calling at Colon and Newport News *en route*. These vessels carry passengers, cargo, and mails. The average time taken is about 42 days, the total distance being 11,000 nautical miles.

(*b*) New Zealand to East Coast U.S.A. A regular service is maintained from New Zealand ports to Boston and New York *viâ* Panama Canal. The approximate distance is 9,000 nautical miles, the time taken being about 31 days.

(*c*) Other vessels of this Company trade between Great Britain and Australia (Sydney) *viâ* the Suez

Canal, the Cape of Good Hope, or Panama.

(7) **The American and Australian** (A. and A.) **Line** maintains a regular service from New York to New Zealand ports *viâ* Panama Canal.

(8) **White Star Line.**—This trades from Auckland or Wellington to New York *viâ* Panama and the West Indies. The Company has several shipping services, including one between Australia (Sydney) and the United Kingdom (Southampton), *viâ* Durban and Capetown. Connection with this service must be made by means of the intercolonial services already named.

(9) **The Canadian Government Line** maintains a direct monthly cargo service between Montreal (summer) or Halifax (winter) and Auckland, Wellington, Lyttelton and Dunedin *viâ* Panama.

C.—Communication

New Zealanders are well provided with means for communicating with one another and with other parts of the world.

(1) **Postal.**—Inland mails are carried by rail and by motors, coaches, and coastal steamers. During recent years the system of rural mail deliveries by contractors travelling on motor-cycles or in motor-cars has been considerably extended. Most of the steamship companies named above carry mails on behalf of the New Zealand Government. The mail routes are given below.

MAIL ROUTES TO AND FROM NEW ZEALAND.

Intercolonial.

1. Union Steam Ship Company, Ltd., Huddart Parker and Company, Ltd., and various other lines.

(*a*) Mails are sent by almost every steamer leaving a port in New Zealand for a port in Australia, and *vice versâ*. There are regular weekly services between New Zealand (Auckland or Wellington) and Sydney; and a service every three weeks leaving alternately from Wellington or Bluff to Melbourne, returning *viâ* Bluff or Wellington.

(*b*) There are services about twice monthly to Suva (Fiji), and about once a month to Apia (Samoa),

Rarotonga (Cook Islands), Papeete (Tahiti), and Nukualofa (Friendly Islands).

Foreign.

1. *Viâ* **Vancouver** (Canadian and Australasian Royal Mail Line)—Every 4 weeks. Auckland, Suva, Honolulu, Vancouver, London. Average time, about 31 days.

2. *Viâ* **San Francisco** (U.S.S. Co.)—Every 4 weeks. Wellington, Rarotonga, Papeete, San Francisco, London. Average time, about 30 days.

3. *Viâ* **Panama** and *viâ* **Cape Horn** (Direct Route)—The New Zealand Shipping Company, the Shaw Savill and Albion Company, the Federal Steam Navigating Company, and the Cunard (Commonwealth and Dominion) Line maintain direct services between New Zealand and the United Kingdom *viâ* Panama or *viâ* Cape Horn. It is very seldom, however, that these routes are used for other than parcel mails and specially addressed correspondence. The frequency is irregular.

4. *Viâ* **Suez.**—Mails for the United Kingdom and Continent of Europe are not now sent by this route. Mails are, however, received from the United Kingdom *viâ* Suez.

The joint result of all these lines is that mails leave New Zealand regularly once a week and sometimes twice a week for Australia; and the frequency from Australia is about the same. Mails from the United Kingdom for New Zealand are despatched *viâ* North America (San Francisco and Vancouver), Panama and Suez at about weekly intervals, and mails from New Zealand for the United Kingdom at fortnightly intervals. Parcel mails from the United Kingdom are received *viâ* Suez and Panama only. Mails for Africa and the East are sent *viâ* Australia.

(2) **Telephone.**—Telephone exchanges are installed in all the larger and in many of the smaller towns in New Zealand. New exchanges are being added each year, thus bringing increasingly large numbers of the community into telephone communication with each other. In the large centres aerial wires have been replaced to a great extent by underground cable, while in the smaller towns the earthworking system has been replaced by the more efficient metallic circuit system. The automatic telephone system is in operation at Auckland, Blenheim, Christchurch, Hamilton, Master-

ton, Oamaru, Palmerston North, Wanganui, and Wellington, and is in course of installation at other places.

By means of toll communications telephone exchange subscribers are enabled to converse with persons connected with other exchanges or telephone offices. This utility is availed of to a very large extent and brings persons situated at great distances apart into close touch with each other. The installation of telephone repeaters—for the purpose of facilitating long distance communications between the North and South Islands—is being arranged.

(3) **Telegraph.**—A fairly complete system of aerial telegraph wire links all but the smallest post offices, so that, for a small sum, messages can be sent by telegraph from one end of the Dominion to the other in a few minutes. A machine-printing telegraph system has been introduced, and is working satisfactorily between Auckland, Wellington, Christchurch, and Dunedin. Further extensions of this system are contemplated. Wireless stations of the quenched gap system are in operation at Chatham Islands, Auckland, Awanui (218 miles N.W. of Auckland), Awarua (Bluff) and Wellington. The Wellington station is equipped, in addition, with a valve transmitter for communication on continuous and interrupted continuous waves. Of these stations, Chatham Islands, Auckland and Wellington are low-power stations having a normal working range of 300 miles by day and 600 miles by night, although these ranges are considerably extended under ordinary conditions. The Awanui and Awarua radio stations are medium-power stations having a rated range of 500 miles by day and 1,000 miles by night, these ranges also being considerably exceeded in practice. The Awanui station deals principally with public radio-telegraphic correspondence between New Zealand and Apia (Samoa) and Rarotonga (Cook Islands). The wireless stations at Apia and Rarotonga are administered by New Zealand, as are also three "feeder" stations, viz., Aitutaki, Mangaia, and Niue,

the first two of which communicate with Rarotonga, and the third with Apia.

All the ocean liners calling at New Zealand and a large number of the vessels engaged in the coastal or intercolonial trade are fitted with wireless telegraphic apparatus. A scheme for the linking up of all portions of the Empire by a chain of wireless stations* is now on foot.

Amateur radio stations licensed under Government regulations have been successful in establishing communication on low power with distant parts of the world. The broadcasting of music, lectures, news, etc., by radio-telephone broadcasting stations, offers "listeners-in" in remote localities the opportunity of hearing the news of the day, and of enjoying concerts, lectures, etc., given in the cities. A scheme for the more satisfactory development of the broadcasting service is now being introduced whereby a modern broadcasting station will be erected and operated at each of the four main centres, Auckland, Christchurch, Dunedin, and Wellington.

(4) **Cables.**—Communication between one Island and another, and with Australia and other parts of the world, is maintained by electric cables, which are linked up with the aerial wire telegraph system. The North and South Islands are connected by six cables.

A. Inter-Island Cables.

1. Five cables leave the station at White's Bay, Port Underwood, in the South Island, and cross Cook Strait. Two of these land at Lyall Bay, near Wellington, and three at Oterangi Bay, near Cape Terawhiti. A sixth cable crosses the Strait from Picton to Titahi Bay, near Porirua.

2. Stewart Id. and the Great Barrier Id. are linked by cables with the mainland, while short cables are used to connect with lighthouses or to cross rivers and harbours, *e.g.*, Lyttelton Harbour.

B. Foreign Cables.

New Zealand is linked with Australia (and with Europe) by two distinct cables.

1. **Eastern Extension Cables.** — Two cables run from Wellington (Grey Street) underground to Titahi Bay, thence to

*See page 188.

Sydney, whence three routes are available to Europe. See page 187.

2. **Pacific Cable** (All Red Route).—One cable from Auckland to Sydney direct. Another cable from Auckland to Norfolk Island and thence to Southport (Queensland), and from Southport to Sydney. Also a cable connects Norfolk and Suva, so that Suva works direct to Sydney. A third cable from Auckland proceeds to Suva. The main cable continues from Norfolk Island to Suva, Fanning Island, Bamfield (Vancouver Island, British Columbia). Another cable will shortly be laid from Suva to Fanning Island and thence to Bamfield, so that there will be a duplicate cable service from Australia to Bamfield. At Bamfield connection is made with the landline which crosses Canada to Halifax, and joins the Imperial Atlantic cable to England. Messages may be sent from Halifax by other Atlantic cables if so routed. A cablegram sent from Auckland is transmitted only four times before reaching London, viz., at Suva, Fanning Island, Bamfield, and Halifax. Each transmission is automatic.

In 1923-24 the Pacific route took 65.2% of the business and the Eastern route 34.8%.

5.—TRADE AND COMMERCE

How Trade Arises.—Every place on the earth that becomes the permanent abode of man is able to produce something to satisfy some of the wants of its inhabitants, else it would not be occupied. But even the smallest village nowadays is rarely self-supporting, and needs to obtain from its neighbours or other outside source certain articles which it cannot itself produce as cheaply as it can get them from elsewhere. As it is with villages so it is with districts, and countries. No country produces all the things its people need, but all countries produce much more than they require of some things, and this surplus they exchange for the surplus produce of other lands. It is this exchange of goods between the various parts of a country, and between one country and another, that is called **trade** or **commerce.** Within the limits of one country this interchange of goods makes up what is known as **local** or **internal trade.** **External** or **foreign trade** is that which takes place with other lands. Countries that form part of a continent have one or

more lands adjoining them, so that part of their foreign commerce takes place across the border; but New Zealand, being surrounded by ocean, conducts all her foreign commerce* in ships.

Year.	Total Trade.	Imports.	Exports.	Excess of Exports.
	£	£	£	£
1918 ..	52,700,000	24,200,000	28,500,000	4,300,000
1919 ..	84,600,000	30,600,000	53,900,000	23,300,000
1920 ..	108,000,000	61,500,000	46,400,000	-15,100,000
1921 ..	87,700,000	42,900,000	44,800,000	1,900,000
1922 ..	77,700,000	35,000,000	42,700,000	7,700,000
1923 ..	89,300,000	43,300,000	45,900,000	2,600,000

Total Trade.—The above figures show the value of the total trade for the six years 1918-1923. In the first place it should be borne in mind that the high values quoted, except in 1920, were attributable more to rising prices than to the interchange of increased quantities of the various articles of trade. The amount for 1918 represents a steady increase on preceding years, while the exceptionally high figure reached in 1919 indicates a release of shipping, which enabled accumulated stocks of wool, meat, and dairy produce purchased by the Imperial Government to be got away. The alarming increase in 1920 was attributable to an unprecedented expansion of imports due to the following causes:—

(1) Continued prosperity seemed to warrant increased imports;

(2) prices continued to rise;

(3) traders imported heavily anticipating a continuance of past difficulty in getting orders fulfilled;

(4) comparative slackness of trade at Home led exporters there to execute all long standing orders on their books, and dump their stocks upon overseas markets.

*Though all goods are bought for a money price, it is not really the money which passes in exchange, but the goods and services whose value is measured by the money price. These are exchanged by means of bills of exchange. In foreign trade exports pay for imports, and any excess of one over the other can be balanced in other ways than by the shipment of gold, notably by depreciation of the debtor country's exchange. The shipment of gold is avoided as much as possible, and though it does frequently pass in normal times, it is possible to do without it altogether.

The figures for 1921-23 represent a return to normal conditions appropriate to a growing country.

Exports.—We have seen that New Zealand is first of all a pastoral country, secondly a mining country, thirdly, a forest country, and to a much smaller extent an agricultural, manufacturing, and fishing country. The above table shows the value of exports for the six years 1918-1923. An analysis shows that from 88 to 92 per cent. of our exports are pastoral products, from 1·7 to 3·1 per cent. are minerals, 2 per cent. are forest products, and from 1 to 2·3 per cent. agricultural produce. The importance of pastoral products is increasing, while that of other classes of industry is declining.

An analysis of the export figures is given for 1923. Of the £45m. over £41m. represented the value of animal products exported, viz., wool £10·9m., butter £10·6m., frozen meat £9m., cheese £6·8m., skins, £2·3m., and tallow £·7m. The value of cheese and butter and frozen lamb showed the most marked increase, while wool showed a decrease.

The export from mines included gold approximately £·7m., coal £·1m., silver, scheelite, etc. Here, however, it should be noted that while nearly all the gold produced is exported, most of the coal produced is consumed within the country. The exports of forest products, totalling £1m., included timber £·47m., kauri gum £·47m., and fungus. Agricultural products, valued at £·5m., included very small quantities of all kinds. The export of phormium (flax), which is a partially manufactured product, was £·3m. The value of other manufactured articles exported, such as cordage, soap, and woollen goods, was relatively insignificant. Indeed manufactured articles constituted only 3 per cent. of the total export.

Destination of Exports.—For forty years preceding the end of 1917, $\frac{4}{5}$ of our total exports went to the United Kingdom. This proportion dropped in 1918 to less than $\frac{2}{3}$. For many years prior to the Great War, Australia received the second largest share of our ex-

ports, but after 1916 the United States took second place, while in 1918 Canada's share also exceeded that of Australia. In 1923 the Mother Country and other British Possessions absorbed 90 per cent. of our exports. The order of importance was (1) United Kingdom, £37·3m.; (2) United States, £3·5m.; (3) Australia, £2·6m.; (4) Canada, £·6m.; (5) Pacific Islands, £·46m. The principal other countries that received our products were India, France, and Japan. Of the total exports to the United Kingdom, about one-tenth is usually re-exported to north-western Europe and America. The re-exported commodities include wool, frozen meat, butter, sheep-skins, kauri-gum, and phormium.

Excess of Exports.—For many years past our exports have exceeded our imports in value, usually by several million pounds (see table on page 125). This is owing largely to the fact that New Zealand has borrowed money from England and pays annual interest for the loans, in the form of increased export of goods. In the same way, too, she pays freight for the carriage of her goods to and from other lands in British and foreign ships. As the introduction of new capital and the payments for interest, and for shipping and other services are continually operating in opposite directions at the same time, it is obviously only the *balance* of these transactions that appears as excess of exports or of imports. The excess in 1919 was, of course, abnormal. The unexpected unfavourable balance of 1920 has been accounted for above.

Imports.—The figures quoted also show steady expansion in our import trade. The bulk of our imports has always consisted of manufactured and partially manufactured articles. In 1923 the proportion was 77 per cent. The principal imports in 1923 were (1) textiles, including drapery, linens, cottons, woollens, silks, and apparel, and boots and shoes, £10·4m.; (2) metals and metal goods, hardware and machinery, over £8·5m.; (3) motor vehicles and accessories, £3·4m.;

(4) spirits, wine, beer and tobacco, £2·5m.; (5) oils, £2·3m.; and (6) sugar and tea, £2·2m. Next in order of value came (7) paper, books and stationery; (8) drugs and chemicals; and (9) fruits of all kinds. Of the above classes the third has shown most marked advance in recent years.

Origin of Imports.—New Zealand's imports come principally from the United Kingdom, United States, and Australia. In 1923, the order and values were: (1) United Kingdom, £24m.; (2) United States £6·6m.; (3) Australia, £4·2m.; (4) Canada, £2·9m.; (5) Fiji £·8m.; (6) India, £·73m.; (7) Ceylon, £·7m.; (8) Japan, £·5m. The United Kingdom, which in normal times supplies 60 per cent. of our imports, in 1923 supplied only 55 per cent., while the United States supplied 15 per cent., and Australia 9·7 per cent. India supplies jute goods (corn-sacks and wool-packs); Fiji, raw sugar; and Ceylon, tea.

The following table summarises much of the information stated above:—

Table showing Origin (Countries of Shipment) of Imports and Destination of Exports.

Countries.	Imports from 1923. £	Exports to 1923. £
United Kingdom ..	24·0m.	37·3m.
Australia	4·2m.	2·6m.
Fiji	·8m.	·1m.
India and Ceylon ..	1·43m.	·38m.
Canada	2·9m.	·6m.
U.S.A.	6·6m.	3·5m.
France	·7m.	·3m.
Japan	·5m.	·2m.
Others	2·2m.	·92m.
	43·3m.	45·9m.

Entrepôt or Transit Trade.—Some of our imports come not from the country which produced or manufactured them, but indirectly from another country which previously imported them. There is thus often a distinction between the country of shipment and the

country of origin. The figures quoted above refer to countries of shipment and not to countries of origin. This re-export trade is termed *entrepôt* trade. Thus New Zealand imports some French (and German) goods from the United Kingdom, Canadian goods from the United States, Chinese goods from Hong Kong, and British, Indian, Javan, Chinese, and Japanese goods from Australia. She in her turn re-exports a variety of foreign commodities to the Pacific Islands.

Trade with United Kingdom.—The United Kingdom, which in pre-war times secured ·7 of our trade; in 1918 secured a little more than ·5. An examination of the above figures will show that the Mother Country has already re-established her former trade supremacy in New Zealand. The articles of trade cover almost the whole range of commodities already named as exported and imported. She possesses her large share in New Zealand's trade because: (1) There is much British capital invested here, and this fact turns trade to the United Kingdom. (2) Sea transport is almost a British monopoly. Trade is governed very largely by the facilities that exist for transport. (3) Our banks are closely connected with, if not controlled by London. Hence all exchange transactions are made through London.

Other considerations of a more or less sentimental nature that are partly the cause and partly the result of the above facts are:—(1) The similarity of climate and civilization renders the needs of both much alike, and each is fitted by Nature to supply what the other lacks. New Zealand exchanges her surplus of foodstuffs and raw materials for a portion of England's surplus of manufactured goods. (2) The relation of mother and daughter* existing between the two implies a common blood and a common speech. Thus the intercourse, for which kinship and affection create a desire, is made easy because Englishmen and New Zealanders speak a common language. (3) English-made goods are of excellent quality and are surpassed by very few

*As is often said, "Trade follows the Flag."

articles of foreign make. (4) London is the greatest distributing centre in the world. All countries send goods to London; so that goods of German or French manufacture are often bought there instead of being imported direct from the country of origin. (5) The New Zealand Government has for some years encouraged trade within the Empire by charging higher import duties on certain articles of foreign manufacture or production than she imposes on similar goods coming from British countries. This is termed Imperial Preference.

In her foreign trade New Zealand has one serious disadvantage* to contend with, and that is the great distance she lies away from her principal market. The greater the distance, the higher is the price that must be charged those who buy the goods exported. The shortest route to London is 11,000 miles long, whereas ships from the eastern ports of Canada have from $\frac{1}{5}$ to $\frac{1}{4}$, and those from the Argentine about $\frac{1}{2}$ that distance to traverse. It is only by the most careful and minute attention to the quality, packing, and grading of her staple exports that New Zealand can hope to improve or even retain her position in the world's markets. Better organization at the ports of discharge should reduce very considerably the cost of handling, storing, and distributing. The provision of ample cold storage on the continent of Europe, if carried out as recently projected, is likely to extend New Zealand's market for frozen meat, and so is a hopeful feature of the present outlook.

Trade with United States.—During recent years the United States has ousted Australia from second place among the countries with which we trade, probably because she has to some extent captured trade that but for the Great War, would have gone to the United

*Another hindrance to New Zealand trade is her protective tariff, imposed partly for the sake of revenue, and partly to assist local industries by raising the price at which foreign manufacturers can sell their goods in the Dominion. There is much to be said for and against both protection and Free Trade; but a discussion, or even enumeration of them is out of place here.

Kingdom. Owing chiefly to the high tariff barriers set up by the United States and the cost of transport from the eastern States, our exports to that country are much less than our imports from it, despite the great shipping facilities provided by the Panama Canal. In 1923 the articles traded in were:—

Imports from United States:—Machinery, motor vehicles and materials therefor, electrical machinery, iron and steel, hardware, benzine and other motor spirits, kerosene, oils, paper, leather, textile goods, boots and shoes, tobacco, timber, seeds, fruit (dried and fresh), cinema films.

Exports to United States:—Wool, sheepskins, sausage skins, kauri gum, gold, phormium, seeds.

Trade with Australia.—Australia ranks third in the list of countries with which we trade. Our trade with her is due to the fact that she is our nearest neighbour, and is of great extent; to her tropical and other special products; to the market for agricultural produce she affords us when her own harvests are insufficient; and to the larger stocks of foreign manufactured goods which her merchants keep and upon which we are able to draw. A large proportion of our Australian trade, both import and export, is with New South Wales.

The commodities in which trade is carried on with Australia in 1923 were:—

Imports from Australia:—Coal, timber, tobacco, leather, tropical and other fruits, dried fruits, salt, arrowroot, chemical manures, bark, flour, sugar, wine and spirits, coffee, gold, silver, and copper coins, metals, stationery, machinery, hardware, rice.

Exports to Australia:—Skins, hides, butter, timber, gold, silver, phormium, seeds, fish, meats, hops, machinery, cheese.

Trade with Canada.—Our trade with Canada, while small, has been steadily increasing. The articles traded in in 1923 were:—

Imports from Canada:—Motor vehicles, paper, preserved fish, timber, boots and shoes, machinery.

Exports to Canada:—Butter, sausage skins, wool, hides, kauri gum.

Trade with Pacific Islands.—New Zealand has a minor trade with the Pacific Islands, including Samoa.

This comprises the import of raw sugar (Fiji), copra, coffee, cocoa beans, tropical fruits (oranges, bananas, coco-nuts), guano, hats; and the export of European foodstuffs and manufactured articles of clothing, hardware, etc. The latter is largely *entrepôt* trade.

In the western Pacific is the little island of **Nauru***. Great Britain, Australia, and New Zealand hold a joint mandate from the League of Nations to administer this island, taken from Germany in 1914. It is highly important as possessing vast deposits of phosphate, an invaluable manure. New Zealand may have 16 per cent. and Australia 42 per cent. of the annual output. The deposits here and on Ocean Island were purchased from the Pacific Phosphate Company for £3½m., New Zealand contributing her quota of this price. The output in 1922 was over 193,000 tons. Works have been established in New Zealand for grinding the raw phosphate imported, *e.g.*, at Onehunga, and for the manufacture of superphosphate.

Trade with France.—This was never large, but has increased during the cessation of our trade with Germany. The latter, however, is no longer subject to the trade restrictions imposed during the War.

Imports from France:—Materials for motor vehicles, silks, satins, ribbons, gloves, velvet, tobacco-pipes, brandy, wine, cream of tartar.

Exports to France:—Wool, butter.

Trade with Japan.—The restriction upon imports from Europe due to the War caused an expansion of our import trade in articles of Japanese manufacture. Our export of wool thither, however, is growing slowly. Our trade with Japan is hampered by the fact that Japanese manufactured goods are frequently very inferior to sample.

Imports from Japan: — Silks, satins and velvets, cotton goods, apparel, fancy goods and toys.

Exports to Japan:—Wool, casein.

Trade with South America:—It is worthy of note that the substitution of the Panama Canal route for the Cape Horn route severed the connection which this country formerly enjoyed with South American ports, and for a time extinguished the direct export trade in stud sheep, agricultural implements,

*Or Pleasant Island.

and fresh fruit that was developing. This trade is now reviving.

Some details of interest regarding the sources of a few common commodities are worthy of mention. Our **tea** supply, which formerly came from China, now, owing to the preferential tariff, comes chiefly from Ceylon, and is supplemented by smaller quantities from Java, India, and China, or from these sources indirectly through Australia. Raw **coffee** is supplied mainly by India and Java, and a small quantity comes from Ceylon. Coffee essence and chicory are imported from Australia. Manufactured **cocoa** comes from United States, Australia and England, while cacao beans are supplied by Samoa and Ceylon. Our **sugar** supply, which formerly came chiefly from Mauritius, comes now in a raw state mainly from Fiji and from Java. It is refined in Auckland (Chelsea). A small quantity of refined sugar is imported from Australia. **Salt** is supplied by Australia and the United Kingdom. **Rice** is obtained chiefly from Australia (*entrepôt*), India, and Burma.

Ports and Trade.—The ports of the Dominion may be arranged according to the amount of trade they do. In 1923 the order was:—

Exporting Ports:—(1) Wellington, (2) Auckland, (3) Lyttelton, (4) Dunedin, (5) Napier, (6) Invercargill, (7) Timaru, (8) Wanganui, (9) Gisborne, (10) New Plymouth.

All of these exported over £1m. worth of produce. Next in importance, though far behind, were Oamaru, Greymouth, and Wairau (with Picton). Wellington regained its supremacy owing to the fact that the west coast ports of both Islands, as well as Nelson and Wairau, sent their produce thither for transhipment to overseas vessels. Indeed the above order would be completely changed were exports considered as according to the district of production. In particular Auckland, Wanganui, and New Plymouth would take a higher place.

Importing Ports:—(1) Auckland, (2) Wellington, (3) Lyttelton, (4) Dunedin, (5) Invercargill, (6) Napier. The four leading ports named control most of the import trade. This is due to the fact that the distribution of imported goods is chiefly done by rail from the four largest cities. It is noteworthy that the trade of either Auckland or Wellington is more than that of Lyttelton and Dunedin combined.

Total Trade.—Totalling the trade of the ports for 1923, the order was: (1) Wellington, £26·4m.; (2) Auckland, £26·3m.; (3) Lyttelton, £11·4m.; (4) Dunedin, £7·5m; (5) Napier, £3·5m.; (6) Invercargill, £3·5m.; (7) Timaru, £2·4m.; (8) Wanganui, £2·1m.; (9) Gisborne, £1·8m.; (10) New Plymouth, £1·8m. The relative importance of the ports in total trade is identical with that in the export trade. It is noteworthy that

Timaru trade has revived and that Patea is no longer a port of importance.

6.—POPULATION

Census and Estimate.—A census of the population of New Zealand is now taken at intervals of five years. The last census was taken on 17th April, 1921. According to the returns of that date, the total white population in the Dominion was 1,218,913. The estimated population on 31st March, 1924, is given on page 10. The next census will be taken in April, 1926.

Nationality.—At least 98% of the white people of New Zealand are of British stock. The Maori population is now increasing, and is estimated at over 54,000. The aliens in the Dominion include the natives of most European countries, *e.g.*, Austrians, Germans, Scandinavians and Danes. More than 6,000 aliens were naturalized during the twenty years preceding 1915. The United States of America, Canada, and even South Africa prove more attractive to emigrants of these races, owing to the nearness of those lands, their huge extent, and the greater possibilities they offer. The coloured population includes a few thousand half-castes, Chinese, Syrians, and Hindus. All immigration is regulated by law, and that of coloured aliens is subject to severe restrictions.

Increase.—The increase of population consists of the excess of births over deaths (or natural increase), together with that of immigrants (arrivals) over emigrants (departures). By way of the former excess, New Zealand gained during the years 1921-23 an average of about 17,000 a year. By way of the latter excess she gained during the same period an average of over 9,000 persons per annum. Though the majority of our immigrants come to the Dominion at their own expense, the Government has for many years followed the policy of affording State aid to desirable immigrants. In 1923 the number of assisted immigrants was about 6,100. Many of our immigrants are nominated by friends or relatives in the Dominion who undertake

to find them accommodation and work upon arrival. The British Government, too, is assisting the emigration of ex-service men. Though many more of our immigrants appear to come from Australia than from the United Kingdom and elsewhere, and though most of our emigrants appear to go to Australia, the fact is that Australia is very often merely the last or the first place of call *en route* from or to other lands.

Distribution.—Though the first settlements in New Zealand were made in the North Island, settlement, when once begun in the South Island spread faster there, because of the large amount of easily accessible land, the peaceful character of the few Maoris that were living in it, and, later, the greater extent and attractiveness of the goldfields there. Some time between 1896 and 1901, however, the tables were turned, and since that period the North Island has had a larger population than the South. In 1924, 61 per cent. of the white population, or 62 per cent. of the total population, was in the North Island. The North Island has:—(1) The two best harbours in the Dominion—Waitemata and Port Nicholson; (2) a more attractive climate; and (3) greater natural resources awaiting development (*e.g.*, timber, dairying, and sheep country), and less waste area (lofty mountain summits). Hence for many years it has attracted young people from the South Island, as well as the majority of the immigrants from Great Britain. The latest figures, however, indicate a drift of population towards the South Island.

Density.—Wellington takes the lead among the provinces, and then come Auckland, Canterbury, and Otago in order. When, however, the density of population is considered, that is, the number of persons to the square mile, the order is:—Wellington (24), Taranaki (18), Auckland (17), Canterbury (15). The population of the chief towns is given in a later section (see pp. 139-164). The density of population over the whole of New Zealand is 13 per square mile. This number is very low compared with that of other lands inhabited by European peoples:—United States (34),

Germany (328), United Kingdom (392), and Belgium (641). One reason for the smallness of our population is the youth of our country. Then the dense population of the great western nations is largely due to the extent and wealth of their manufacturing industries. Our population is also low compared with that of the great eastern nations, India and China, which owe their dense population to totally different causes, such as the thrift of the people, the high degree of soil fertility, and the low standard of living.

The influence of the physical features and natural resources of the Dominion in determining the distribution of its population have already in a general way been explained in the first section of this part. (See pp. 58-62.) Other points of interest in connection with the question of *distribution* will now be dealt with.

1. **Order of Settlement.**—The earliest settlements were on harbours and (with the exception of Russell) near good grazing or farming land. Russell, Wellington, Auckland, Wanganui. New Plymouth, Nelson, Dunedin, and Lyttelton (Christchurch) were settled in turn, and each (except Auckland and Wanganui) was the first spot settled in the respective provinces, and so had the advantage of an early start.

2. **Comparison with Australia.**—New Zealand is more fortunate than Australia (see page 184), in that her population is more evenly distributed throughout the land. About $\frac{1}{3}$ of the population of New Zealand is assembled in the four largest urban areas (cities), and over 1-10th in the remaining ten suburban areas (Hamilton, Gisborne, Napier, Hastings, New Plymouth, Wanganui, Palmerston North, Nelson, Timaru, and Invercargill). Though this shows a relative decline in rural population in recent years, the disproportion between town and rural population is far greater in Australia. The more even distribution of the population in New Zealand is due to the following causes:—

(*a*) **The wide distribution of the natural resources of the Dominion.** Fertile soil, excellent grazing land, valuable forests,

and rich minerals are plentiful and well scattered over the whole country. There are no wide stretches of desert, and the few tracts of unprofitable land (about 3¾ million acres) bear a smaller proportion to the total area of the country than do the barren lands of Australia to the total area of that continent. Thus almost every part of the country is capable of supporting an industry, and the forest land is being rapidly cleared and brought into more profitable use.

(*b*) **The equable climate.** In all parts of the Dominion the climate is equable and healthy, and is favourable to energetic labour on the part of white men. Regions of low rainfall are being rendered fertile, or at least capable of grazing sheep and cattle, by irrigation, *e.g.*, the drier parts of the Canterbury and Otago by water-races. Swampy districts are being drained (see page 38).

(*c*) **Smallness of the country and number of early settlements.** New Zealand is a small country, and was settled from a relatively large number of points. (See section 1 above); whereas Australia is a huge area, and was settled from a few widely separated points, Sydney, Melbourne, etc.

(*d*) **Comparative ease of communication.** The smallness of the country, the great extent of coast-line, and the nearness of all parts to the sea, together with the absence of serious natural obstacles on land render transport and communication by road, railway, and steamer comparatively easy and cheap. Produce from the most remote parts can readily be carried to market.

(*e*) **The invention of meat-freezing, and the application of machinery** to the milking of cows and the manufacture of butter and cheese, have stimulated sheep and dairy-farming in the Dominion to a greater degree compared with the area than in Australia, and so have led to a wider distribution of the population.

(*f*) **The attractive nature of barren districts.** Snow-capped mountains, ice-fields, volcanic and thermal districts (though unproductive lands and unfit for close settlement or permanent residence) attract a large floating population of tourists. New Zealand's scenic attractions are more numerous and striking in proportion to her size than those of Australia.

(*g*) **The State policy of closer settlement.** A law passed in 1900 gave the Government of New Zealand power to purchase large estates from private persons, divide them into small farms, and sell or lease them to farmers. Up to the year 1924 over 1,980,000 acres had been acquired for this purpose. Since 1918, purchases have been entirely for discharged soldiers, upwards of three-quarters of a million acres being bought and settled. In this way the land is made to support as large a population as possible. Though about 3⅘ million acres have been sub-divided for the purpose of closer settlement in Aus-

tralia, the system has not succeeded in drawing many people from the large cities.

3. **Dependence upon Manufactures and Cheap Power.**—The dependence of New Zealand people mainly upon pastoral and agricultural pursuits sets a strict limit to the increase of population; for, as soon as all the land is being made use of to the fullest extent, any additional population must employ itself in manufactures. New Zealand can never become densely populated as, for example, the north-eastern states of America and the northern, central, and south-eastern counties of England are, unless she can support large manufacturing industries. At present her inability to work her iron deposits seems to render this unlikely, though a hopeful sign for the future is the harnessing of the energy stored in our lakes and waterfalls for the purpose of generating electricity by which machinery may be cheaply driven.

Hydro-electricity when used on a large scale is the cheapest form of power and lighting applicable to the needs of industry, and New Zealand is fortunate in possessing abundant water-power available for the generation of electricity. It is produced in New Zealand at 28 stations, 20 of which are operated by local authorities, 5 by private companies, and 3 by the State. Of the first-named, the Dunedin City Council Works at Waipori Falls, 32 miles from the city, afford the best example. Of private works, the most important are the Waihi Gold-mining Company's works at Horahora Falls, near Cambridge, and the Dominion Cement Company's works at Wairua Falls, 24 miles from Whangarei. The former was purchased by the Government in 1920, and the power is used throughout the Waikato district. The Lake Coleridge works in Canterbury, however, owned by the State, are the most important yet established. Already Christchurch, 65 miles distant, and a region stretching from Rangiora in the north to Timaru in the south is well supplied from this source. Among the uses to which the power is already applied are transport (tramways), and driving machinery in freezing works, dairy factories, tanneries, flour-mills, woollen-mills, etc. The Southland Electric-power Board is establishing a station at Lake Monowai. The Government has designed three works that will provide the North Island with cheap light, heat, and power. The sources are, (1) the Mangahao River, near Shannon; (2) the Arapuni Rapids, on the Waikato River, 20 miles above Cambridge; and (3) Waikaremoana. The Mangahao plant, to be completed in 1925, is intended to supply the

southern half of the North Island from Wanganui and Napier to Wellington. The Arapuni works are under construction, and the Waikaremoana system is in full operation. The industrial advantages of cheap electricity are incalculable; for in addition to the immense saving of labour and the stimulus thus afforded to manufactures of all kinds, its use effects a very large annual saving in coal, firewood, and oil, as well as in the cost of transport of these fuels.

7.—TOWNS OF NEW ZEALAND

AUCKLAND

Seaports and Coast Towns

Whangarei (4,950)* beautifully situated on Whangarei Harbour, exports quantities of coal (from Hikurangi), kauri gum, timber, flax, and fruit (oranges, lemons, etc.). Dairy factories, and lime and cement works are in operation here.

The town is on the site of a pioneer settlement dating back to the early Forties of last century. A few miles inland is **Kamo**, where there are excellent mineral medicinal springs. A railway links Whangarei with the Bay of Islands at **Opua**, 54 miles to the north, and with **Auckland**, 95 miles to the south. A short line runs also to **Onerahi**, 6 miles nearer the open sea.

Dargaville (2,160) on the right bank of the Northern Wairoa River, which is navigable for large ocean-going steamers for 30 miles, and for small vessels for 70 miles, exports timber and kauri gum.

It has regular steamer communication with Helensville, 64 miles to the south, thence by rail 38 miles to Auckland. There are butter-factories and a flax-mill in the neighbourhood.

Auckland (with suburbs 173,000) is beautifully situated on the southern shore of Waitemata Harbour, and is the largest city and the second seaport in New Zealand. It stretches to Onehunga, 9 miles distant, on Manukau Harbour, thus linking the east and west coasts. The chief exports are butter and cheese,

*Population in round numbers, according to the latest estimates, is given for all towns with 1,000 or more inhabitants. This gives some idea of the relative importance of different centres of population. The figures given for the four chief cities refer to "urban areas," which include even distant suburbs.

frozen meat, wool, hides, gold, flax, timber, tallow, and kauri gum.

Auckland is admirably situated for trade with the South Sea Islands, Australia, and America. It has a large Pacific Islands business, and the coasting trade is the busiest in the Dominion. Many branches of industry are carried on in the city and suburbs: chief among which are ship-building, sugar-refining, meat-freezing, flour-milling, fruit-canning, sash and door manufacture, rope and twine making, the manufacture of pottery, bricks and tiles, bottles, varnish, ammunition, and boots. It has two graving-docks—the Calliope Dock and a smaller one—large wharf accommodation, and many fine buildings. It is connected by rail with Rotorua, and by the Main Trunk Line with Wellington, 425 miles distant. Regular mail services leave Auckland for Sydney and Vancouver. Mail and cargo steamers ply regularly to Fiji and Samoa, as well as to eastern Pacific Islands. From its position and harbour facilities, Auckland is best fitted to be the naval station of the Dominion. Auckland was the capital of the Colony from 1840, the year of its foundation, to October, 1864.

Onehunga (7,860), on Manukau Harbour, is connected by rail and electric car with Auckland, of which it is really a suburb, and forms its western port. It exports timber, and possesses a woollen factory and phosphate crushing works.

Steamers leave regularly for New Plymouth and Hokianga.

Thames (4,920), including **Grahamstown** and **Shortland**, is situated on the Firth of Thames, and is an important town in the centre of the once rich Thames goldfield. In the drained swamps of the Thames and Piako Valleys (Hauraki Plains) there is much dairying and flax-growing land.

Gold was the principal mineral product here; but iron, copper, zinc, manganese, and silver were also found. Thames is connected by steam and rail with Auckland. Further north, on the Hauraki Gulf, is Coromandel, still a gold-mining town, having steamer communication with Auckland 42 miles distant.

Tauranga (2,495), on the roomy and well sheltered but shallow Tauranga Harbour, is the outlet of a rich agricultural, dairying, and timber area. It is the nearest port to the Thermal Springs District.

There are motor-car services to Rotorua and to Matamata, and steamers to Auckland. The East Coast railway runs

through the town. Near Tauranga is the famous Gate Pa, where the Maoris repulsed the British troops with great loss in 1864.

Gisborne (14,000), on Poverty Bay, 86 miles north-east of Napier, is the outlet for the products of a rich agricultural and pastoral district. Meat-freezing (works at Kaiti and Waipaoa) and dairying are important industries; wool and frozen mutton are the leading exports.

Poverty Bay was the first landing place in New Zealand of Captain Cook in 1769. The harbour is artificial, and a breakwater protects the wharves which berth vessels up to 300 tons. Larger vessels lie in the roadstead.

Inland Towns

Otahuhu (3,080), on Tamaki Creek, nine miles south of Auckland, has manure and acid, soap and candle, and milk preserving works. Two meat-freezing works are at **Westfield**, and one at **Southdown**, a mile or two to the north.

Huntly (1,795), on the Waikato River, is a coal-mining and railway town, with pottery, brick and tile works.

Frankton Junction (1,900), a rising town at the junction of the Main Trunk Line and the Rotorua branch, has a bacon-curing factory.

Hamilton (13,620), on the Waikato, is picturesquely situated near the junction of the Main Trunk and Rotorua and Thames Valley Railways. It is the centre of a fine agricultural and pastoral district, and has soap works, sash and door, bacon-curing, and dairy factories.

Te Awamutu (1750), the chief town of the Waipa district, is on the Main Trunk Railway, and is the centre of the richest agricultural and dairying land in the Waikato.

Te Kuiti (2,355), a growing township on the Main Trunk Line, and the chief town of the "King Country," has a dairy factory and lime kilns.

In the vicinity fine limestone caves have recently been discovered.

Taumarunui (2260) is located where the Main Trunk Line meets the Wanganui River, and where the latter is joined by the Ongarue. It is the centre of the King Country timber and dairying industries, and is lit by electricity generated at Piriaka, six miles away.

Cambridge (2,280), on the Waikato, a farming and fruit-growing centre, near the border of the "King Country," is accessible to small steamers.

Several cheese and butter factories lie between Hamilton and Cambridge. A branch line connects the latter with the Rotorua railway line at Ruakura Junction.

Paeroa (1,725), on the Thames railway and head of the Thames River navigation, is a rich gold-mining town and centre of a dairying district. Sawmilling is also carried on.

Waihi (3,850), the richest quartz-mining town in New Zealand, is situated 13 miles from Paeroa, on the Thames railway. **Waikino**, which has the largest battery in New Zealand, is 5 miles away.

Waihi is on the route of the East Coast Railway through Tauranga, now being constructed. The celebrated mines of the Waihi Gold-mining Company get hydro-electric power from the Horahora Falls. These power works have been taken over by the Government.

Te Aroha (2,290), on the Thames, 115 miles by rail from Auckland and 36 miles from Thames, is the centre of a rich farming and dairying district. Flax-milling is also carried on.

Te Aroha is celebrated for its medicinal mineral springs. Its baths do not quite equal those of Rotorua, but there is a valuable drinking water.

Rotorua (4,220)—native villages, **Ohinemutu** and **Whakarewarewa**—on Lake Rotorua, is the chief tourist resort of the Thermal Springs District. (See pages 47 and 165).

Rotorua is the town of the great New Zealand Wonderland. Electric light has been installed and large baths and hotels have been built by the State for the accommodation of tourists and invalids. As a spa it is considered superior to those in Europe and America. It is reached by rail from Auckland, or by motor from Tauranga and Napier.

Minor Towns

Most of the small ports named are visited daily, weekly, or twice weekly, by small steamers from Auckland.

Mangonui, once a whaling town on Doubtless Bay, now has kauri gum and timber trade and farming in its vicinity.

Whangaroa, on Whangaroa Harbour, has a considerable export trade in timber and gum. There is copper ore in the neighbourhood. The crew of the "Boyd" were massacred here by the Maoris in 1809.

Russell (Kororareka), on the Bay of Islands, the oldest township in New Zealand, once a flourishing whaling station, was, for a few months in 1840, the first capital of New Zealand. Opposite Russell is **Waitangi**, where the famous Treaty of Waitangi was signed on 6th January, 1840.

Warkworth, a dairy-farming township on Hauraki Gulf, has hydraulic lime and cement works, and a fruit-canning factory.

Waiwera, on Hauraki Gulf, is a watering-place of Auckland, and is noted for its mineral springs.

Opotiki, a port near the eastern end of the Bay of Plenty, produces large crops of maize, wheat, and fruit. As the back country is cleared of bush, sheep and cattle are increasing in numbers. The bar-harbour is safe and navigated by shallow-draught steamers.

Taupo, on Lake Taupo, at the outflow of the Waikato River, is a small village visited by large numbers of tourists, and is remarkable for its hot springs and other volcanic phenomena. It is only 6 miles from the Wairakei wonderland. (See pages 48 and 165.)

Whakatane, a rising town in the progressive Bay of Plenty district, has meat-freezing works and dairy factories.

Mercer, on the Waikato River, on the Main Trunk Line, is a saw-milling and dairying centre. **Tuakau** is a farming and flax-milling township.

Ngaruawahia, south of Huntly, at the junction of the Waikato River and its tributary, the Waipa, has a butter factory. Fifteen miles away, on the road to Raglan, are the Waingaro Hot Springs.

Raglan, on Whaingaroa Harbour, is a farming and grazing settlement with timber mills.

Ongarue, on the Main Trunk, 14 miles north of Taumarunui, has a sawmill.

Kihikihi, 3 miles from Te Awamutu, is the township of a very good dairying country. **Orakau**, the scene of the famous three-days' siege of 1864, is 3 miles to the east.

Te Kopuru, **Aratapu**, and **Mangawhare**, on the Northern Wairoa, once were purely sawmilling townships, but agriculture and dairying are now largely followed.

Helensville, on Kaipara Harbour, has hot springs as well as a large trade in timber, fruit, dairy produce and kauri gum. It is connected by rail with Auckland, 38 miles distant.

Kohukohu, on Hokianga Harbour, exports kauri gum and timber.

HAWKE'S BAY

Most of the towns in Hawke's Bay are inland, the more important being situated along the Napier-Wellington railway line. Most of the southern towns are on the site of the old Seventy Mile Bush, which is now occupied chiefly by dairy farms and sheep farms. Napier is the only coast town of importance.

Chief Towns

Napier (with suburbs 18,205), on Hawke Bay, is the chief town of the Provincial District. Owing to its considerable export trade, which is next to that of Lyttelton, it ranks fifth among the ports of the Dominion. The surrounding district being chiefly pastoral, wool, cattle, frozen meat, skins, hides, tallow, as well as flax are the principal exports.

The port of Napier, named Port Ahuriri, distant from the town about two miles by rail and electric tram, can berth vessels of small size, while larger vessels have to lie in the roadstead. A breakwater is built sufficiently far to berth steamers drawing up to twenty-four feet. The city has a clean and healthy appearance, one of its attractions being a fine esplanade two miles long planted with Norfolk Island pines. In the neighbourhood are large freezing-works (**Westshore**), fellmongeries, and soap-works. Napier is connected by rail with Eskdale, Wellington and New Plymouth, and by road with Taupo, Rotorua, and Wairoa.

Wairoa (2,125) (Clyde), on the Wairoa River, is in the midst of excellent sheep country.

A butter-factory, flax-mill, fish-curing works, and freezing-works have been established. There is motor communication with Lake Waikaremoana (2,000ft.), 35 miles distant, the source of hydro-electric power for the district. As it has been proved impossible to keep Wairoa Harbour free from silt, it has been decided to utilise a natural harbour at Waikokopu,

some 18 miles to the east, which is now being connected by rail with Wairoa. Twenty-six miles from Wairoa are the Morere Hot Springs.

Taradale (1,035), on the Tutaekuri Basin, within five miles of Napier, supplies that city with dairy produce and vegetables.

Hastings (9,975), on the Ahuriri Plain, near the mouth of the Ngaruroro River, 12 miles by rail from Napier, is the centre of a rich agricultural, pastoral, and fruit-growing district.

The factories there include three freezing-works (**Paki-paki, Tomoana** and **Whakatu**), and butter-factories. The jam factory is not now in operation.

Waipawa (1,150), near the Tukituki River, is the centre of a rich pastoral district.

Waipukurau (1,540), south of Waipawa, a growing town on the Tukituki River, is also the centre of a sheep-farming district in which closer settlement is taking place.

Dannevirke (4,010), in the Upper Manawatu Basin, was first settled by immigrants from Denmark in 1872. It was established in the Seventy-Mile Bush, now rich agricultural country. There are dairy factories in its vicinity.

Woodville (1,180), near the Manawatu River and Gorge, is built on land formerly part of the Seventy-Mile Bush. It is in a dairying and stock-fattening district, with cheese and butter factories.

In 1910 the Woodville freezing-works were converted into a ham, bacon, and lard factory. Being at the junction of three lines of railway, the town has a splendid position for receiving and distributing produce.

Minor Towns

Petane is a small township north of Napier, on the road to Taupo and Gisborne.

Clive, on the Ngaruroro River, six miles from Napier, is in a dairy-farming, market gardening, and fruit-growing district. It has wool-scouring works and a butter-factory.

Havelock, near Hastings, on the Ahuriri Plain, is the centre of a farming and fruit-growing district. Excellent grapes are grown, from which wine is made. In the township are potteries and brick kilns. Several excellent private boarding-schools are located here.

Opapa (formerly Te Aute), 27 miles south of Napier, in the centre of a sheep-farming district, has a college for educating Maoris.

Otane (Kaikora), in the upper Tukituki basin, is in a sheep-farming district.

Takapau, on the Napier-Dannevirke railway, between Waipukurau and Ormondville, is the chief township of the Ruataniwha Plain, and is growing in importance as a farming centre. Soldiers' settlements have been established in the vicinity.

Ormondville, in the Seventy-Mile Bush, in the upper Manawatu basin, has a dairy-factory.

Norsewood, a dairy-farming township, a few miles west of Ormondville, was first settled by Scandinavian immigrants in 1872. Its cheese has an established reputation.

TARANAKI

The towns of Taranaki, though still small, have grown much of recent years. Most of them are situated inland, there being no harbours of first-rate importance.

Chief Towns

New Plymouth (13,090), on the Tasman Sea, between Cape Egmont and North Taranaki Bight, is the chief town and port of the district. In or near the town are sash and door factories, a boot factory, a tannery, a flourmill, and a dairy produce freezing works. There are also meat-freezing works at **Smart Road.**

There is no natural harbour, but a breakwater, running nearly half a mile into the open sea, affords good shelter, and large vessels berth here. Extensive dredging operations and enlargement of the harbour are in progress. Steamers run twice a week to Onehunga, and call here on their way from Wellington, while ocean liners call regularly for frozen meat. Iron sand abounds along the neighbouring shore. At Moturoa, where the port of New Plymouth is situated, a little crude petroleum has been obtained, and further boring is being carried out. Recently New Plymouth has come into prominence as a tourist resort, its chief attractions being its beautiful Pukekura Park, and the neighbouring grand peak, Mt. Egmont.

Waitara (1,630), a roadstead town, on the Waitara River about one mile from its mouth, has large meat-freezing works, and a growing export trade.

It has railway communication with New Plymouth, about 10 miles distant. Large steamers load meat from lighters.

Inglewood (1,230), seventeen miles south-east of New Plymouth, on the railway line, is the centre of a flourishing district. It has an up-to-date bacon factory.

Stratford (3,180), on the Patea River, has important dairy factories, and there are large sawmills further inland.

A branch railway (Toko Branch) to connect with the Main Trunk line at Okahukura, near Taumarunui, is open for traffic to Tahora, 48 miles to the north-east.

Eltham (2,120), inland on the New Plymouth-Wellington railway line, is a dairying centre, and has a meat-packing works and bacon factory. It also has a large factory which makes cheese crates and butter boxes.

Hawera (4,435), situated about two miles from the sea on the eastern fringe of the Waimate Plains, is the second largest town of Taranaki, and is the centre of a very rich dairying and meat-raising country.

Patea (1,180), a small port with a bar-harbour, near the mouth of the Patea River, and on the Wellington-New Plymouth Railway, possesses butter and cheese factories and a freezing works.

Minor Towns

Normanby, three miles north of Hawera, on the railway line, has a dairy factory.

Manaia, 10 miles from Hawera, is the centre of a cattle-raising and dairying district.

Opunake, a dairying township on the coast, is on the main road from Hawera to New Plymouth.

Whangamomona, 38 miles from Stratford, on the Stratford-Main Trunk line, is the centre of a cattle and sheep-raising district. There is also timber-milling in the district.

WELLINGTON

The principal inland towns of Wellington lie along the Wellington-Napier line of railway through the Wairarapa Valley to the east of the Tararua Range, and along the Wellington-New Plymouth line, to the west of the Tararua Range. Wellington is the only seaport of importance, the river ports being Foxton, on the Manawatu, and Wanganui, though small ships may obtain some shelter off Porirua Harbour.

A convenient grouping is as follows:—

1. **Port Nicholson** and **Hutt Valley.** — Wellington, Petone, Lower Hutt, Upper Hutt.

2. **Wairarapa Plain.**—Featherston, Martinborough, Greytown, Carterton, Masterton.

3. **Forty-Mile Bush.**—Mauriceville, Eketahuna, Pahiatua.

4. **Western Slope** and **Main Trunk Railway.**—Porirua, Otaki, Levin, Foxton, Longburn, Palmerston North, Feilding, Marton, Bulls, Wanganui, Waverley, Taihape, Ohakune.

Chief Towns

Wellington (with suburbs, 114,500), on Lambton Harbour, a bay of Port Nicholson, is the chief town of the Province and the capital and chief port of the Dominion. The total trade of the port in 1923 reached 1⅓m. tons. From its central position it is admirably situated for trade with all parts of New Zealand, the Australian States, America, and Europe.

In or near the city are meat-freezing works, sawmills, woollen factories, soap and candle works, carriage factories, iron and brass foundries, boot factories, rope and twine works, sash and door factories, brick, tile, and pottery works, match and box factories, and a hosiery mill.

The harbour is land-locked and commodious, with deep water close to the main streets of the city. By cutting away the sides of hills, and by making use of material obtained in dredging, the Harbour Board has reclaimed much valuable land along the foreshore. In 1865 the seat of Government was transferred from Auckland to Wellington, on account of the central position of the latter. The city motto, *Suprema a Situ,* expresses this advantage of situation. Wellington has gradually become the headquarters of many of the large business firms of the Dominion. The chief business premises are on level reclaimed land near the wharves,

while the residences are built on the surrounding hill-sides. The Houses of Parliament and the Governor-General's chief residence are situated in Wellington. Lines of railway connect the city with Napier, New Plymouth, and Auckland.

Petone (8,480), on Port Nicholson, facing the entrance, has a meat-preserving and freezing works, a woollen factory, the Government Railway Workshops, Lever's soap works, and other factories.

It is seven miles by rail from Wellington, and is the oldest settlement in the province. Here was established "Britannia," the first village of the pioneers, who soon, however, shifted to the present site of Wellington City.

Lower Hutt (6,370), a favourite residential suburb on the Hutt River, is eight miles by rail from Wellington. Market gardening is now the most active industry.

Upper Hutt (1,730), at the head of the Hutt Valley, is a small farming and dairying centre.

Two miles nearer Wellington is the **Trentham** rifle range.

Greytown (1,200), on a branch railway line in the Ruamahanga Basin, is near the middle of the rich sheep and cattle grazing, farming, and fruit-growing district known as the Wairarapa Plain.

It has woodwork mills and a dairy factory.

Carterton (1,700), in the Ruamahanga Basin, has sawmills and a number of cheese factories.

Masterton (8,325), in the Ruamahanga Basin, is the chief town of the Wairarapa Plain, and has woodware-mills, flour-mills, cement works, butter and cheese factories, tanneries, and fish hatcheries.

Wheat, oats, and wool are products of the neighbourhood, and there is a freezing works at **Waingawa**, 3 miles away.

Pahiatua (1,355) is an important dairying township in the district formerly occupied by the Forty-Mile Bush. It has several dairy factories, and does a little woodwork milling.

Levin (2,160), on the Wellington-Manawatu railway, has dairy farms in its vicinity. Two miles distant is a Government experimental farm.

Foxton (1,710), near the mouth of the Manawatu River, is a thriving river-port connected by branch railway with Palmerston North.

Coal (from Greymouth), and other goods are landed here for distribution inland. Owing to the number of flax-mills in the neighbourhood, Foxton exports considerable quantities of New Zealand hemp. It has also a rope and twine factory. Dairying is carried on in the vicinity.

Palmerston North (17,000), on the Manawatu River, near the Manawatu Gorge, is the largest inland town in the North Island. It is a railway centre of great importance, from which lines radiate to Napier, New Plymouth, Auckland, Foxton, and Wellington.

When the neighbourhood was densely bushed, saw-milling was the chief industry. Now the town is a flourishing farming centre with manufactures of farm implements, flour, bricks, sashes and doors, butter and cheese, and boots. There is a dried-milk ("Glaxo") factory at **Bunnythorpe**, seven miles to the north.

Feilding (4,655), inland on the Oroua, a tributary of the Manawatu, was formerly the nearest township to a large tract of bush. Most of this has been cleared and settled by dairy farmers and sheep farmers.

The town owes its origin to a special settlement made by a private English company about 1874. Several dairy factories are established in the district, as well as flour mills, and a sash and door factory in the town. There is a freezing works at **Aorangi**, one mile by rail to the south-east.

Marton (2,595), in the Rangitikei Basin, is the centre of an agricultural and pastoral district, and the junction of the Main Trunk Railway with the Wellington-New Plymouth line.

In or near the town are several creameries, a cheese-factory, a flour-mill, and a sash and door works. Six miles distant by rail is the **Kakariki** freezing works.

Wanganui (with suburbs, 22,820), near the mouth of the Wanganui River, is an important river port, and the centre of a large grazing and farming district. Meat-freezing (at **Imlay** and **Castlecliff**), the manufacture of woollens, flour-milling, soap-making, and biscuit-making are carried on.

There are wharves at the town and at the heads four miles distant. Improvements to the bar-harbour are in progress. Large English steamers lie off the mouth of the river to load meat from the freezing works at Castlecliff. The latter is connected by tram and rail with the town. Special steamers convey tourists up the river to Pipiriki (59 miles), and motor-launches ascend to Taumarunui (136 miles), on the Main Trunk.

Taihape (2,175), on the Main Trunk Railway, once a busy saw-milling town, is now chiefly a farming centre. A mile to the south-east by rail is the **Winiata** freezing works.

The site of the Awarua Forest between this township and Mangaweka now supports a thriving farming population.

Minor Towns

Ngahauranga, near Wellington, has two meat-freezing and preserving works.

Featherston, at the southern end of the Wairarapa Plain, is the centre of a rich farming and pastoral district, and has butter and cheese factories.

Martinborough, on the eastern edge of the Wairarapa Plain and near Lake Wairarapa, is a sheep and dairying centre.

Mauriceville, in the Forty-Mile Bush, has lime-kilns and a dairy-factory.

Eketahuna, in the Forty-Mile Bush, is an important sheep and dairying centre.

Porirua, on Porirua Harbour, is a small coastal township surrounded by a sheep and dairy-farming district.

Otaki, a small town on the Wellington-New Plymouth railway line, produces wool, dairy produce, and fruit. It is a market gardening centre, and the Wellington City Council dairy factory is located here.

Longburn, 85 miles from Wellington, the old northern terminus of the Wellington-Manawatu railway, has meat-freezing works, dairy-factories, saw-mills, and flax-mills.

Bulls, a township near Marton, in a rich farming and pastoral district, has a dairy factory. Two miles distant is Flock House Farm, where the sons of British seamen who lost their lives in the Great War are taught farming.

Waverley, near the Taranaki border, is situated in a rich farming and dairying district. There are butter-factories, a flour-mill, and a flax-mill in the township.

Ohakune, on the Main Trunk railway about midway between Wellington and Auckland, is largely engaged in saw-milling.

As the bush is cleared, dairying will become more and more widespread. Tourists visit the township *en route* to Pipiriki, Mt. Ruapehu, and also Lake Taupo (*viâ* Waimarino).

MARLBOROUGH

Marlborough is mainly a mountainous district, the most level portions (including the Wairau Plain) lying near the east coast. The towns are therefore principally on or near the coast, and are small, there being only two containing more than 1,000 inhabitants.

Chief Towns

Blenheim (4,780), near the east coast, on the Opawa River, which is navigable by small vessels, is the chief town of the Province. It is the business centre of the agricultural and pastoral district called the Wairau Plain, the chief products of which are barley, peas, lucerne, chaff, hay, wool, and meat.

Flour-milling is carried on chiefly with wheat imported from other provinces. Flax-milling is another minor industry. The town is accessible to small river vessels, which take away agricultural produce. It is connected by rail with Picton and Wharanui. It was formerly nicknamed Beavertown, owing to its frequent floods.

Picton (1,410), beautifully situated near the head of Queen Charlotte Sound, is the chief port of the district, and has steam communication with Wellington, Havelock, Nelson, and West Coast ports.

It has a freezing works, and exports frozen meat, chaff, fresh fish, barley, and wool.

Minor Towns

Havelock, at the head of Pelorus Sound, has an important timber trade. A little gold-mining is carried on in the neighbourhood. Scheelite was mined at Deep Creek, 12 miles distant, during the War.

Seddon and **Ward** are sheep-farming centres on the railway running south from Blenheim.

Renwicktown is a small town seven miles west of Blenheim, surrounded by farms and sheep-stations.

Kaikoura, on the east coast, is the port of a grazing and farming district. Small steamers run direct to Lyttelton and Wellington. The town is prettily situated on the north shore

of the Kaikoura Peninsula. There is a modern whaling station in South Bay, the site of a station dating back about seventy years.

NELSON

Nelson is a mountainous, well-timbered country, and is rich in minerals. The population is fairly well distributed throughout the Province, so that the towns are not large. Indeed, only six of them exceed 1,000 in population.

Chief Towns

Nelson (with suburbs, 11,400), pleasantly situated on Tasman Bay, is the chief town and port of the Province. Owing to its fine climate, it is noted for its tomato, fruit (raspberries, peaches, apples, etc.), and market gardens. It manufactures preserves, condiments, biscuits, and confectionery.

An artificial entrance to the harbour has been cut through the Boulder Bank, and a channel dredged to admit large steamers (during flood tide only) to the city wharves. Trade is carried on with Greymouth, Westport, Motueka, Picton, Wellington, New Plymouth, and Onehunga. There is a daily motor service across the picturesque Whangamoa and Rai Saddles to Blenheim, 80 miles distant. **Tahuna**, just south-west of the city boundary, is a rapidly growing seaside resort, possessing a magnificent sandy beach, affording good bathing facilities.

Richmond (1,200), on the Waimea Plain near Tasman Bay, is the centre of a fertile district famed for its fruit and flowers.

Motueka (1,500), at the mouth of the Motueka River, is the outlet of a rich fruit-producing (apples, peaches, pears) district.

In the township there are fruit-canning and preserving factories, besides bacon and dairy factories. There is steamer communication with Wellington and Nelson, also an excellent daily motor service with Nelson, 35 miles away. To the south-east lie the extensive orchard districts on the low-lying Moutere Hills and in the Tasman Valley, about 5,000 acres being in cultivation. The chief outlets are **Motueka** and the port of **Mapua**, opposite Rabbit Island.

Westport (3,850), at the mouth of the Buller, has the best of the bar harbours on the west coast of the

South Island. The chief export is the famous steam coal obtained from high-level mines at Coalbrookdale, Denniston, and Millerton, as well as from Westport-Stockton, Seddonville, and Mokihinui.

Millerton is reached by rail to Granity, a model residential village, thence two miles up a steep hill to a height of 1,200 ft. Gold is also exported. Granite is quarried at Cape Foulwind.

Reefton (1,600), on the Inangahua Creek, a tributary of the Buller, is an important town engaged in the mining of gold quartz and coal.

It has railway connection with Inangahua Junction, Greymouth, Hokitika, Ross, and Otira, and daily motor service with Glenhope and Westport. The gold output has been declining, but a revival is anticipated. The coal deposits are very great, and the output is increasing.

Denniston, 14 miles north-east of Westport, is a coal-mining town at a height of 1,960ft. above sea-level.

It is reached by train to Waimangaroa, thence 3½ miles up a steep hill on foot, or 6½ miles by motor.

Minor Towns

Tadmor, a farming centre 42 miles south of Nelson by rail, is on the inland railway from Nelson. The line passes through **Stoke** (fruit preserving factory and freezing works), **Wakefield, Belgrove**, and **Tadmor**, to **Glenhope**, 60 miles south of Nelson.

Murchison, 27 miles nearer Reefton, is a rapidly-growing township, the centre of dairying country. It has good coal deposits.

Takaka, on Golden Bay, has saw-mills and butter and bacon factories. Near by are the Motupipi limestone caves, and the extensive cement works at **Tarakohe**. Marble is exported. There is a daily motor service with Nelson, 70 miles distant.

Collingwood, on Golden Bay, is the centre of a saw-milling and dairying district. Five miles distant are the gold-sluicing works and iron deposits of **Parapara**. The **Onakaka** iron works are 10 miles to the south-east.

Riwaka, five miles north of Motueka, is the centre of rich agricultural country. It exports marble for building purposes.

Runanga (1,265) is a railway station and miners' residential village five miles north of Greymouth, near the late **Point Elizabeth** State coal mine.

Barrytown, twenty miles north of Greymouth, is surrounded by rich land. It has a flax-mill.

Karamea, a small coastal town, is the centre of a progressive dairying and timber-milling district. It is connected by motor service with Westport.

Hanmer Springs is a township situated on the Hanmer Plains, in the Amuri County, at an altitude of 1,200 ft., and is surrounded by grazing country. See also page 172.

Culverden is a sheep-farming centre between the Waiau-ua and Hurunui Rivers.

Waiau, a farming centre, lies east of the Hanmer Springs. It is the terminus of the northern railway passing through Culverden.

Parnassus is the northern terminus of the South Island main line of railway.

Port Robinson is the tiny port of the Cheviot District that was subdivided into small farms and grazing runs in 1893.

NOTE.—The settlers of the south-east of Nelson, *i.e.*, in the Amuri and Cheviot districts, look to Christchurch as their centre. Indeed, all this region (from the Conway River) is now a part of the Canterbury Land District. In the same way the townships of south-western Nelson are dependent upon Greymouth, and the Westland Land District boundary extends from 20 to 30 miles north of the Provincial boundary.

CANTERBURY

Canterbury consists of the eastern slopes of the Southern Alps, together with the great plain lying at their feet. It has only an eastern fringe of coast, on which there are two important seaports. A number of townships are dotted over its surface.

CHIEF TOWNS

Christchurch (with suburbs, 115,360), on the River Avon, is the chief town of the Provincial District. It is situated on the eastern margin of the Canterbury Plains, and is connected by rail with the principal towns of Canterbury and Otago, and also through a tunnel in the Port Hills with Port Lyttelton, seven miles distant.

Christchurch is the trading centre for the agricultural and pastoral country of North Canterbury. It has the advantage of cheap electric light, heat, and power from the Lake Coleridge station. Among its numerous industries are the manufacture of carriages, books, boots, and clothing, iron and brass goods and agricultural implements, as well as tanning and wool-

scouring, flour-milling, biscuit-making, and the making of bricks and pottery, soap, and candles. The nearest freezing works are at **Islington**, seven miles to the west.

The city possesses many fine buildings, notably two cathedrals, the Provincial Council Chambers, Canterbury University College, and the Museum, which is the best in the Dominion—though its Maori collection is inferior to that of Auckland Museum. The public parks and city squares are amongst the principal features of the city. The city has an abundant high pressure artesian water supply, which is supplemented by private artesian wells. **Sumner** and **New Brighton** are popular watering places on the coast; and Cashmere, on the lower slopes of the Port Hills, is a favourite suburb.

Ashburton (5,145), on the Ashburton River and the main southern railway line, is the centre of one of the largest farming districts in the Dominion.

In or near the town are freezing-works (Fairfield), and also woollen-mills, flour-mills, and butter-factories. **Hampstead** (1,400) is in reality a suburb of Ashburton. **Tinwald** lies south of the river, on the railway line. The effort to strike petroleum at **Chertsey** has proved a failure.

Rangiora (2,100), on the Ashley, has large flour-mills (at Southbrook and Woodend), and flax mills (at Waikuku), and is the centre of a large farming district.

Kaiapoi (1,740), on the north railway line, near the mouth of the Waimakariri (a tidal river with bar), is accessible to small vessels, and has a large woollen-mill, a flour-mill, and a meat-freezing works.

There are also factories for bacon-curing, timber-dressing, and the manufacture of farm implements. An effort is being made to improve the entrance to the Waimakariri River for coastal shipping by building a training-wall there.

Waimate (2,175), in the Waihao basin, on a branch line of railway, owes its origin to the sawmilling industry of Waimate bush: it is now the centre of a farming and grazing district.

Its chief industries are farming, flour-milling, and the cultivation of strawberries and raspberries.

Geraldine (1,000), on the Waihi, in the Opihi basin, is the centre of a rich agricultural and pastoral district.

Temuka (1,850), on the Temuka River, a tributary of the Opihi, is surrounded by a fertile sheep and agricultural farming district.

The township has flour-mills, wool-scouring works, butter and cheese factories, a foundry, and a fellmongery.

Chief Ports

Lyttelton (3,850), on Lyttelton Harbour (a crater harbour, see p. 23), is the port of Christchurch seven miles distant, and the third largest port in the Dominion. Large quantities of wool, grain, frozen meat, and other agricultural and pastoral produce are exported.

Lyttelton possesses a large graving dock, and a spacious and well-sheltered harbour whose natural advantages have been enhanced by breakwaters, dredging, and reclamation. The town is built on the hillside, and its growth is retarded by the need for better communication with the Plains than the Lyttelton tunnel (Canterbury's bottle-neck) affords.

Timaru (15,230), on the east coast and the southern railway, is the chief town and port of South Canterbury. The harbour is entirely artificial, being protected by a breakwater and a rubble wall.

The town exports wool, grain, flour, flax, frozen-meat, and has large flour-mills, woollen mills, woodware factories, and meat-freezing works. The latter are at **Smithfield** and **Pareora**. The district receives electric light and power from Lake Coleridge, but a scheme is on foot to harness Lake Tekapo.

Akaroa (650), on Akaroa Harbour, possesses a beautiful, deep, roomy, and land-locked harbour, and exports fruits, wool, cheese, butter, and cocksfoot grass-seed.

Its growth is hindered by the difficulty of communication with the Plains. The township is a favourite holiday resort of Christchurch residents.

Minor Towns

Belfast, a farming township, nine miles north of Christchurch, has two freezing works and a chemical and manure works.

At **Islington**, seven miles by rail from Christchurch, there are large freezing works. At Hornby, too, a pipe works and chemical works are in operation.

Amberley and **Leithfield**, in the Kowhai basin, are farming centres.

Sheffield and **Waddington** are farming centres 38 miles north-west of Christchurch by rail. Coal is mined in the neighbouring Malvern Hills.

Springfield, on the Kowhai River in the Waimakariri basin, is situated at an elevation of 1,200 ft. on the West Coast Road, 44 miles from Christchurch. It is the centre of a sheep-rearing and farming district; near by is a coal-mine and pottery works. The Midland railway passes through Springfield.

Oxford, in the Waimakariri basin, has a declining timber trade and rising dairying and farming industries.

South Malvern or **Whitecliffs**, in the Selwyn basin, has brown coal-mines, and is connected by rail with Christchurch.

Lincoln (with Canterbury Agricultural College), **Leeston**, and **Southbridge** are farming townships in the Lake Ellesmere district.

Pleasant Point, **Albury**, and **Fairlie** are on the road to Mt. Cook, and are connected by rail with Timaru. They are small farming centres.

Winchester, four miles north of Temuka, has a flax-mill and a flour-mill.

WESTLAND

Westland includes the rainy western slopes of the Southern Alps which are clothed with valuable forests, together with the narrow coastal plain at their feet. Though formerly rich in alluvial gold, it is now principally a saw-milling district. As the bush is cleared, saw-milling is succeeded by cattle raising and dairying, which also flourish on the river flats. In South Westland, Hereford cattle are largely raised. South of Hokitika, the chief obstacles to progress are the high rainfall, the extent of swamp lands, and the consequent difficulty of transport.

Chief Towns

Hokitika (2,400), at the mouth of the Hokitika River, is the provincial capital of Westland. As it has now practically no shipping, the products of the district (timber, gold, flax, butter, lime, and tinned whitebait) are sent away by rail.

Hokitika has failed as a harbour owing to its exposed position, the high cost of protective works, and of keeping

open the channel through the shifting sand-bar. Timber is the chief product, gold being now of slight importance. Whitebait are abundant in the river, and catching and canning are carried on from September to the end of the season. A railway runs south to Ross and north to Greymouth, Reefton, and Inangahua Junction.

Greymouth (pop. Grey Valley boroughs,* 6,840), at the mouth of the Grey River, is the chief port and largest town of Westland. The river has been rendered navigable by the construction of breakwaters and internal training-walls giving a minimum depth of 12ft. over the bar. It exports large quantities of coal, as well as gold, timber, and flax.

Three lines of railway radiate from Greymouth: one south-west to Hokitika and Ross, another north to Rewanui, and the third north-east to Stillwater Junction, where the line branches south-east to Otira and north-east to Inangahua Junction. The chief coal mines are at Blackball, Paparoa, Brunner and Dobson, in the Grey Valley, and the State collieries which lie adjacent to the Government coal mines railway running north from Greymouth through Runanga (4 miles) to Rewanui (8 miles), viz., Point Elizabeth near Dunollie (now worked out), and Liverpool, 2 miles from Rewanui, where the coal bins are. Runanga is not a mining town, but was laid out by the Government as a residential town for State miners. A branch line of 3 miles has been constructed from Runanga towards the sea to open up the new James (State) colliery at Nine Mile. (See minor towns of Nelson.)

There is a possibility that the completion of the Midland Railway may divert some of Greymouth's growing trade to Lyttelton and Christchurch, its bar harbour being inaccessible to large vessels, or to any vessels in rough weather.

Minor Towns

Brunner (525) (or Brunnerton), on the Grey River, eight miles by rail from Greymouth, is a coal-mining town, but its importance as a township is declining. The town is on the Midland Railway. Coke-burning, brick and tile making are carried on in the neighbourhood.

Stillwater Junction is a rising township 9 miles from Greymouth. Its position as the principal railway junction in Westland will give it steadily increasing importance. **Kumara**, beautifully situated on the Taramakau River, six miles from the sea and four miles from the railway, was formerly an important gold-mining town. It has a flax-mill, but is other-

*Including Runanga and Brunner.

wise a declining township. **Ross**, fifteen miles south-west of Hokitika, near the Totara River and the sea, has large timber trade and a lime-kiln. Fish are plentiful. It was also formerly a rich gold-mining centre. South of Ross there are cheese-factories at Waitaha, Herepo, and Wataroa. The product has to be carted to Ross. **Okarito**, in South Westland, awaits either harbour construction or railway communication to develop its timber, flax, and cattle industries.

OTAGO

The west coast of Otago consists of almost inaccessible mountains. The towns are therefore confined to the central, southern, and eastern regions. There are three important seaports, and many prosperous mining, farming, and manufacturing towns.

Chief Ports

Dunedin (with suburbs, 75,750), picturesquely situated at the head of Otago Harbour, is the chief town of the Provincial District, and the outlet of a rich farming and coal and gold-mining district. It is also the chief railway distributing centre of Otago.

The wharves can be reached by the largest vessels only at high tide. With Port Chalmers, it ranks as the fourth port in the Dominion, though it is more important for its import than for its export trade. It is the seat of a University College and Schools of Medicine and Dentistry, and contains a Museum, a Hospital, and High Schools. Dunedin was the original headquarters of the Union Steam Ship Company. Numerous manufactures are carried on in and near the city, large numbers of people being engaged in its woollen mills, rope and twine factories, clothing factories, brass and iron foundries, boot and shoe factories, flour mills, paper mills, breweries, and woodware factories. Brighton (12 miles), and Kaka Point (67 miles), are favourite seaside resorts. Warrington (21 miles) is a popular holiday place.

Port Chalmers (2,600), on Otago Harbour, with Dunedin, with which it is connected by rail (8 miles) and by water, is the chief port of the Provincial District.

It has a graving-dock and considerable wharfage, as well as one of the best engineering works in the Dominion for ship repairs. Large ocean-going steamers partly unload here, and

then proceed to Dunedin at high tide to complete the discharge of cargo.

Oamaru (7,145), is the port of North Otago, one of the richest farming and grazing districts in the Dominion, and the second town in the Province. Its harbour is formed by a concrete breakwater. It exports grain, wool, flour, and frozen meat.

It possesses flour-mills and a woollen-factory, and there are meat-freezing works at **Pukeuri**, six miles to the north. Valuable quarries of white building stone (Oamaru limestone) occur in the neighbourhood. The principal buildings of Oamaru are built of this material. Oamaru is the nearest outlet for the Tokarahi and Kurow branch railway lines.

Inland Farming Centres

Mosgiel (1,800), in the Taieri basin, 10 miles by rail from Dunedin, is the principal town of the fertile Taieri Plain. It has large woollen mills.

Mosgiel is situated near the junction of the Otago Central and Main Trunk railway lines, and is itself the junction for the railway to Outram, another farming centre in the same plain.

Milton (1,400), on the Tokomairiro River, is the centre of an important agricultural district, and has a woollen mill, dairy factories, and a bacon factory.

It is the junction for the Lawrence-Beaumont railway, and for a private line to Waronui lignite mines, some six miles distant. **Milburn** lime works are four miles away.

Balclutha (1,500), situated where the railway crosses the Clutha river, has flax mills and dairy factories. There are freezing-works at **Finegand**, two miles to the south.

Balclutha is the junction for the branch railway into the Catlins River saw-milling, flax-milling and pastoral district. River steamers ascend the Clutha for about 25 miles above the town.

Clinton is the centre of a large agricultural and pastoral district.

Palmerston, on the Shag River, and **Waikouaiti**, on the east coast, are important farming and grazing centres. Dairy farming is largely carried on.

Waikouaiti is the oldest settlement (1838) in Otago, and was originally a whaling station and small seaport.

Coal-mining Towns

Kaitangata (1,700), on the Clutha, near its mouth, has large mines of brown coal which is largely used for railway engines and for factory and domestic purposes.

It is on a branch line four miles long, running out from Stirling, a dairying township on the main line. **Benhar** and **Taratu** are lignite mines in the vicinity of Balclutha.

Green Island (2,000), together with **Burnside** and **Abbotsford**, is the centre of an extensive coal-field.

The industries carried on are bacon curing, meat-freezing, flour-milling, iron-smelting, leather dressing, manufacture of chemicals, tanning, etc.

Shag Point, at the mouth of the Shag River, is a small town producing one of the best of our brown coals.

Other lignite mining towns mentioned elsewhere are **St. Bathans** and **Bannockburn** (4 miles from Cromwell).

Gold-mining Towns

Lawrence (700), in the Clutha basin, and on the Milton-Beaumont branch railway, is the centre of a gold-mining and farming district.

In the neighbourhood is Gabriel's Gully, where gold was first discovered in Otago in 1861. Blue Spur (3 miles), Waipori (14 miles), and Waitahuna (7 miles) are adjacent gold mines.

Roxburgh, Alexandra, Clyde (The Dunstan), and **Cromwell**, are gold-mining and gold-dredging centres on the Clutha River.

The Kawarau River, flowing out of Lake Wakatipu into the Clutha, is now the scene of a great gold-winning scheme. The river will be dammed at its source in the winter, in order to allow of the rich gold deposits in its bed being worked.

The Central Otago towns are famous for fruit growing, and State irrigation schemes are in course of development for fruit farms. A dam constructed in the Kawarau River, a few miles west of Cromwell, supplies water for a race that irrigates large orchards, at Ripponvale, thus converting a sandy waste into productive land. Cromwell is the terminus of the Otago Central railway, and has a motor service to Pembroke on Lake Wanaka, and to Queenstown on Lake Wakatipu. Galloway and Chatto

Creek, 6 and 11 miles respectively from Alexandra, depend for their prosperity on State irrigation. (See Appendix V.)

Arrowtown, on the Arrow, is a goldmining town. It also has lignite mines and a flour mill.

Queenstown, on Lake Wakatipu, is the centre of a gold-mining district; but it is now chiefly noted for the beauty of its scenery, and hence as a tourist resort.

Naseby, on the Upper Taieri basin, was formerly one of the principal gold-mining towns of Central Otago, but its importance has declined.

The business of the town is gradually being transferred to **Ranfurly**, 8 miles off, on the railway line. The latter will probably take its place as the trading centre of the extensive farming (oats and wheat) and grazing country of the Maniototo Plain.

St. Bathans, north-west of Naseby, is an important gold and lignite mining town in the midst of a sheep grazing district.

Minor Towns

Kurow, a railway terminus, is the centre of the Upper Waitaki agricultural, pastoral, and fruit-farming district.

Herbert (dairy factory), **Hampden**, and **Moeraki** (sea-fishing), south of Oamaru, are small agricultural towns.

Kingston, at the southern end of Lake Wakatipu, is a railway terminus, and starting point of the Lake steamers.

Tapanui, north of Clinton, on the Waipahi-Edievale branch railway, is the centre of a fertile farming district, and has a dairy factory.

Middlemarch, near the Taieri River, and on the Otago Central railway, is a farming town.

Owaka is the chief town of the Catlins River district. It has several sawmills and a dairy factory. Three miles distant is **Pounawea**, a popular scenic and tourist resort. Lignite has lately been found close to the railway at **Maclennan** in this district.

*SOUTHLAND

Southland has the coolest climate in New Zealand, with an adequate rainfall throughout the year. There is a large amount of level country (river valleys), and this is where most of the towns are situated. The largest

*Since 1870 a portion of Otago Provincial District. See page 10.

town is on the south coast, where there is also a good outlet for the rich products of the district.

Chief Towns

Invercargill (with suburbs, 20,500), on the New River Estuary, is the chief town of the Southland district, and the terminus of five lines of railway. It is the centre of a large farming, grazing and timber country, and has meat freezing works (at **Makarewa**), dairy factories, flour-mills, saw-mills, woollen mills (at **Rosedale**), engineering works, brick and tile works (at **Waikiwi**), and a condensed milk factory (at **Underwood**).

The Bluff (1,600) is the port of Invercargill, 17 miles distant, and is the outlet for the produce of the Southland plains.

The Bluff exports grain, wool, frozen meat, dairy produce, flax fibre, and oysters; and is the first and last port of call for steamers trading with Melbourne. Freezing-works are at **Ocean Beach**, one mile distant.

Gore (3,800), on the Mataura River, is the centre of a rich farming district, and forms the junction of the Waimea Plains railway with the main line.

It has engineering works, a butter and cheese factory, and coal mines (lignite).

Mataura (1,200), near the mouth of the Mataura River, has freezing works, paper-mills, a cheese factory, and coal mines.

Minor Towns

Riverton, at the mouth of the Aparima (or Jacob's) River, has a bar harbour accessible to small vessels. It is 26 miles by rail from Invercargill. Saw-milling is carried on in the neighbourhood. It is the oldest town (1836) in the southern part of the South Island, having once been a famous whaling station. **The Rocks**, two miles distant, is a popular summer resort.

Otautau is the centre of a farming and pastoral district, and has a dairy-factory, with timber and flax-mills in the vicinity. A branch railway runs from Riverton through Otautau to the coaling village of **Nightcaps**, where there are 13 collieries, including Linton and Wairio.

Winton, about 20 miles north of Invercargill, on the railway to Kingston is the centre of a farming and saw-milling district.

Lumsden, on the Oreti River, at the junction of the Invercargill-Kingston and Waimea Plains railway is the centre of a pastoral and agricultural district. It is a railway junction on the lines to Kingston, and to Mossburn, the starting-point on the Te Anau-Milford tourist route.

Edendale, Wyndham, and **Fortrose** are agricultural townships, with dairy-factories in their vicinity. Edendale also has a factory which manufactures sugar-of-milk and casein from skim-milk supplied by creameries in the vicinity.

8.—TOURIST RESORTS*

North Island.

New Zealand is justly noted for the variety and beauty of its scenery. The places of interest to tourists may be classed under the following heads:—

1. Thermal Springs. 2. Coastal Scenery. 3. River Scenery. 4. Lake Scenery. 5. Limestone Caves. 6. Mt. Egmont. 7. Tongariro National Park.

1.—THERMAL SPRINGS.

The **Thermal Springs** District occupies an area of more than 1,000 square miles in the centre and south of Auckland Province. The principal places of interest lie between **Lakes Taupo** and **Rotorua**, a distance of between 50 and 60 miles.

Rotorua (native villages, **Ohinemutu** and **Whakarewarewa**) is the headquarters of the tourist traffic in the Thermal Springs district. It is about eight hours distant from Auckland by rail, and may be reached by motor from Tauranga and Napier. The town is situated at the southern extremity of Lake Rotorua, amidst strange and fascinating scenes. A Government Sanatorium is situated here; electric light is supplied by the State; and the numerous baths in and around it afford great relief to invalids suffering from skin diseases, rheumatism, and neuralgia. There are geysers at Whakarewarewa, wonderful boiling pools at Tikitere and Waiotapu, and at Waimangu a great intermittent mud-geyser.

The unique **Pink** and **White Terraces** now no longer exist, as they were destroyed by the eruption of Mt. Tarawera in 1886. They were situated on the shores of Lake Rotomahana, which was suddenly converted into a volcanic crater. The lake has since become many times its former size, and is still rising.

*See maps pp. 108 and 110. Also New Zealand Souvenir Booklets, "Glimpses of New Zealand Scenery," and "Travel in New Zealand" (2 vols.).

In the extreme south of the region is the magnificent chain of volcanic peaks culminating in the majestic cone of **Mt. Ruapehu.**

Wairakei, six miles from Taupo, possesses even more diversified thermal activity than Rotorua.

Te Aroha lies to the north-west of Rotorua, outside the Central Thermal Springs district. It may be reached by rail from Auckland or Thames, or from Tauranga by motor-car. The baths possess curative properties similar to those of Rotorua.

Other curative hot springs with bath houses are at **Helensville, Kamo,** and **Waiwera,** in North Auckland; at **Waingaro** (15 miles from Ngaruawahia); at **Te Puia,** near Waipiro Bay, and at **Morere,** near Wairoa (H.B.).

2.—COASTAL SCENERY.

The city of **Auckland** and its surroundings present many attractions to tourists. Its harbour is the most beautiful in the Dominion. Near the city are many extinct volcanoes, such as **Mt. Eden, Maungakiekie** (or One-Tree Hill), and **Mt. Hobson,** from which fine views can be obtained. **Lake Takapuna** and **Rangitoto Island** are other points of interest within easy range. The **Waiwera** hot springs, 35 miles distant, on Hauraki Gulf, can be reached by motor or steamer.

Auckland peninsula excels in the beauty of its harbours. Whangaroa, the Bay of Islands, Hokianga, and Whangarei are the most beautiful harbours in New Zealand.

Wellington and **Napier** are both greatly visited by tourists *en route* for the wonderland of New Zealand. From Napier they take motor for Taupo. **Wellington Harbour** is deep and capacious, and the hills surrounding it add to its great natural beauty. From Wellington many tourists proceed by rail across the steep Rimutaka Range to the Wairarapa and Hawke's Bay. Both railway and road pass through the fine Gorge of the Manawatu River.

3.—RIVER SCENERY

The scenery of the **Wanganui River** presents many attractions to excursionists. The river is navigable by steamer and motor-launch for about 140 miles. At the town of Wanganui, which is nine miles from the mouth, the river is a steadily-flowing stream about a quarter of a mile wide. Specially built paddle-steamers ply up and down the river, visiting the Maori settlements and farms along its banks. For the first twenty miles above the town there is little to interest the traveller. Soon, however, the stream narrows, and the banks increase in height and beauty. When the region of settlement is passed and the last vestige of European vegetation disappears from sight, the traveller finds himself in a narrow river gorge whose steep

banks of papa rock are clothed with a dense mass of native bush reaching to the water's edge. Frequent rapids occur, up some of which a passage is made by the aid of steel-wire ropes laid in the bed of the stream.

River settlements are Pipiriki (59 miles), motor to Raetihi; Taumarunui (136 miles) on the Main Trunk Railway.

The river **Waikato**, the **Wairoa North**, the **Waitara**, the **Mokau**, and the **Rangitikei** have also their special points of interest.

The **Thames** can be reached by railway, also by launch and steamboat from Te Aroha, down the Waihou River, or by steamer from Auckland. It is visited for the sake of its scenery, its gold-fields, and its giant kauri trees.

4.—LAKE SCENERY

Taupo is situated on the northern shores of Lake Taupo, which is 241 square miles in area, and is the largest inland sheet of water in New Zealand. The views over the lake are very beautiful. Excursions to various points of interest can be made by launch. Taupo can be reached by motor from Napier or Rotorua. At the southern end of the lake is the native and tourist settlement of Tokaanu, which may be reached by steamer from Taupo, or by motor and train from Pipiriki *viâ* Ohakune to Waimarino, or to Waiouru, thence by motor.

Waikaremoana, which is 11 miles by 8 in extent, is situated in the north of Hawke's Bay province. It is reached from Wellington to Napier by rail; then from Napier to Wairoa by motor (bi-weekly) or by steamer weekly, thence to Lake House by motor. The Government has provided boats as well as a steam launch, and an up-to-date accommodation house. "Waikaremoana" means "Sea of rippling waters." To the north and north-east lies the beautiful Urewera Country, where the Maoris until recently lived in a rather primitive state. The lake is being utilised for generating electric power to supply the eastern portion of the Island.

5.—LIMESTONE CAVES

The **Waitomo**, with the companion caves of **Ruakuri** and **Aranui**, are in the south-west of Auckland, about 15 miles south-east of Kawhia. They are reached by rail (daily) from Auckland to Hangatiki, thence by motor to the Government Accommodation House at Waitomo. A sum of £25,000 is to be spent in extensions and improvements.

The Waitomo Caves are in some places seventy feet high and nearly a mile in extent. They are a wonderful sight, with numerous chambers, grottos, and passages containing lovely stalactites and stalagmites, and a great variety of quaint figures

of limestone formation. The glow-worm grotto is without rival in the whole world. These Caves compare more than favourably with the famous Jenolan Caves in New South Wales. New caves are frequently discovered in this district (*e.g.*, those near Waikato Heads, and others near Te Kuiti) in 1925.

At **Kamo**, also, there are interesting limestone caves.

6.—MT. EGMONT

North Egmont Mountain-house, 20 miles from New Plymouth, is built on the northern face of the mountain (Egmont National Park) at an elevation of 3,200ft. The house is kept for the accommodation of tourists, by a committee in New Plymouth. The vegetation clothing the mountain is first forest, then stunted forest, scrub, tussock, and moss. Above 5,000ft., loose scoria and lava continue to the summit (8,260ft.), from which a splendid view in all directions may be obtained. **Dawson Falls House** (3,100ft.) is situated on the southern slopes, and is reached from Eltham (18 miles distant) by motor. There is also a house on the Stratford side (east).

7.—TONGARIRO NATIONAL PARK

The Tongariro National Park, covering an area of over 60,000 acres, is a public reserve created by Act of Parliament in 1894. It contains a wonderful collection of contrasted natural phenomena, including the three gigantic volcanoes, Ruapehu (9,000ft.), Ngauruhoe (7,500ft.), and Tongariro (6,400ft.). See page 29. The Park may be reached from Waimarino, Ohakune, or Rangataua, on the Main Trunk Railway. There are camp-huts for visitors. A large hostel is to be erected in the reserve.

South Island.

The scenery of the two islands is similar in the general characters of mountain, river, lake, evergreen forest, and plain. Perhaps the northern forest is slightly more tropical in aspect. Each island, however, possesses one important scenic feature peculiar to itself. The North Island has its unique thermal region and the South Island its distinctive alpine scenery. The chief places of interest to tourists are as follows:—

1. The Marlborough Sounds. 2. The Buller Road, through Nelson. 3. The West Coast Road, between Hokitika and Christchurch. 4. Alpine and Glacier Scenery, (*a*) Mt. Cook Region, (*b*) Franz Josef and Fox Glaciers. 5. The Lakeland of Otago. 6. The West Coast Sounds of Otago. 7. The Milford Track. 8. The Hot Springs of Hanmer Plains. 9. Stewart Island.

1.—MARLBOROUGH SOUNDS

Tourist excursions are made by steamer from Wellington to Queen Charlotte Sound and Pelorus Sound. Queen Charlotte Sound was a favourite haven with Captain Cook, who described it as a collection of the finest harbours in the world. "An amphitheatre of hills" locks in its waters from the outer world.

Picton is beautifully situated at the head of the Sound. On his way from Wellington the tourist passes through the picturesque beauties of Tory Channel. In the northern entrance to the Sound is Ship Cove, where Captain Cook anchored on January 16th, 1770. Here a monument has been erected in honour of the great navigator. The historic spot forms part of a scenic reserve of 1,700 acres.

2.—THE BULLER ROAD

Some beautiful scenery occurs on the overland journey from Nelson to Westport and Greymouth. Nelson is reached by steamer from Wellington. The train takes visitors to Glenhope, 59 miles distant, from which point tourists proceed by motor down the Buller Valley. Just before the old mining township of Lyell is reached, the Upper Buller Gorge is traversed where the road is cut along the hillside high above the water. A few miles below Lyell is Inangahua Junction, where the train may be taken for Greymouth. The Buller road proper continues to follow the river valley through the Lower Gorge to Westport, on the right bank at the river's mouth. The chief beauty spots on the road are the two gorges —the Upper gorge, already mentioned, and the Lower, where there are vertical precipices and the road has had, in places, to be cut through tunnels in the rocky cliffs. The Buller Railway, which will link up Nelson with the West Coast, must follow the lower course of the river.

This journey from Nelson to Greymouth combined with the West Coast Road journey, described below, is a favourite tourist route from Wellington to Christchurch.

3.—THE WEST COAST ROAD

The journey from Hokitika or Greymouth to Christchurch by the West Coast Road has lost in point of scenic attraction in proportion as it has gained in increase of speed and in comfort with the completion of the great Arthur's Pass railway tunnel (5½ miles). The coach traveller of former days passed through miles of beautiful forest on the west side. The whole journey is now done by rail.

Perhaps the most enjoyable mode of making the journey is by a camping-out party, and this is sometimes done in summer by groups of visitors from Christchurch. The route from Westland lies along the Taramakau and Otira river valleys up to the

Otira Gorge to Arthur's Pass, the most convenient of the passes in the Southern Alps. The descent to the Canterbury Plains is made by way of the Bealey and Waimakariri river valleys. From a scenic point of view, the western half of the route is by far the more attractive, as it abounds in forest scenery of bewildering loveliness.

4.—ALPINE AND GLACIER SCENERY

Mt. Cook Region.—To reach Mt. Cook (Aorangi), the train is taken at Timaru for Fairlie, 39 miles distant. From there (or from Timaru) the journey is made by motor-car over Burke's Pass (1,780ft.), through the tussock-covered Mackenzie Plains, past the beautiful Lakes Tekapo and Pukaki, and then up the valley of the Tasman River to the new **Hermitage**, an accommodation house on a terrace at the base of the Sealy Range and on the verge of Governor's Bush, at an elevation of about 2,800ft. above sea-level. The present building was completed in December, 1913. The great Tasman Glacier, 18 miles long by 2 miles in width, is larger than any European glacier. Mt. Cook itself, more than 13,000ft. high, was first climbed by a party of New Zealanders on Christmas Day, 1894. The glaciers of the Mt. Cook region cover an area of about 50 square miles, and there are several surrounding peaks more than 10,000ft. high, notably Mt. Tasman and Mt. Sefton.

Franz Josef and Fox Glaciers.—On the western slopes of the Mt. Cook region are the beautiful Franz Josef and Fox Glaciers, 90 miles and 110 miles south of the town of Hokitika. The route generally followed by travellers is from Hokitika to Ross by train (daily), then by motor to the Accommodation House at Waiho Gorge, whence the rest of the journey is made on horseback. The Franz Josef and the Fox are the most wonderful of our glaciers—magnificent ice streams that stretch in glittering masses from the snow-line to the very edge of the forest, about 700ft. above sea-level. The one glacier was named after the Emperor Franz Josef of Austria, who sent out chamois to become acclimatized in our Alpine districts; the other after Sir William Fox. With the aid of a guide climbers may reach the Mt. Cook Hermitage either from the Franz Josef Accommodation House to Karangarua, and thence over the Copland Pass, or *viâ* the Franz Josef Glacier itself and Graham's Saddle.

5.—THE LAKELAND OF OTAGO

A chain of lakes, of which the three southern Canterbury lakes form a part, stretches through Otago almost to the Southern Sounds. Numbers of tourists annually visit them for the beauty of their scenery. Each lake has its characteristic loveliness. Owing to imperfect means of communication the best known are **Wakatipu, Wanaka, Te Anau,** and **Manapouri.**

Wakatipu can be reached by three routes:—(1) From Bluff or Dunedin by train to Kingston; (2) From Dunedin by the Otago Central railway to Cromwell, and then by motor to Queenstown; (3) from Timaru or the Hermitage by motor-car *viâ* Omarama and Pembroke. From Kingston steamers run to Queenstown, a prettily situated little town at the bend of the lake, and thence to Kinloch or Glenorchy, at the head of the lake. From the latter point various excursions can be made up the Rees and Dart Valleys to Diamond Lake, a beautiful diamond-shaped mountain tarn, to Paradise, and the glacier on Mt. Earnslaw. A track has recently been opened to Milford Sound. From Queenstown the favourite climb is Ben Lomond, from which a splendid view of the whole of the Wakatipu country can be obtained. Trips can also be made to Lake Hayes and the adjacent districts. The area of Lake Wakatipu is 112 square miles, and it is surrounded by lofty mountains. Its depth is about 1,200ft.

Wanaka (area about 90 square miles), can be reached by motor from Queenstown to Pembroke, and the return journey made *viâ* Cromwell to Dunedin. **Hawea** lies to the east of Wanaka, and is reached by road; there are large herds of red deer on its shores. These two lakes are capable of supplying electrical energy for central and eastern Otago.

Te Anau (132 square miles), is the largest lake of the South Island. On its west coast are three large fiords, resembling in appearance the West Coast Sounds. A road connects the head of Lake Manapouri with Te Anau at the foot of Lake Te Anau.

Manapouri (50 square miles) is considered by many to be the most beautiful of all the lakes. Te Anau and Manapouri can be reached from Lumsden by motor-car in summer and by coach in winter.

6.—THE WEST COAST SOUNDS

Perhaps the most popular excursion in the South Island for tourists is a visit to the Sounds on the west coast of Otago. There are 13 of these sounds, but the best known is **Milford Sound,** the most northerly of the 13. At the head of Milford Sound are the Bowen Falls,* 530ft. high, while a few miles inland is Lake Ada, near which are the Sutherland Falls, 1904ft. high, one of the highest in the world. Mt. Pembroke with its snow-fields and glaciers, and the curiously-shaped **Mitre Peak** are amongst the most striking features of the Sound. One of the most southerly, Dusky Sound, is of great historical interest inasmuch as Captain Cook in the *Resolution* spent nearly two months here charting, refitting, and recruiting on his second voyage in 1773. Wapiti or elk and moose now provide sport for deer-stalkers in the Sounds district.

*Likely soon to be harnessed to manufacture nitrates from the air.

7.—THE MILFORD TRACK

The Track is open only in summer. The traveller takes the train from Invercargill or Dunedin to Lumsden, whence the south end of Te Anau is reached by motor-car (twice a week). The Lake is traversed by steamer to the Head, and half a mile from the landing-place, Glade House, the starting point of the Track is situated. The Track follows the Clinton Valley, amidst exquisite woodland scenery, and then ascends to the top of Mackinnon Pass—3,400ft. above sea-level—from which point the view is one of the most magnificent for alpine and forest scenery in the world. The Track then continues down the Arthur Valley, past the famous Sutherland Falls, and the beautiful Lake Ada, until the great precipices of Sheerdown and then Mitre Peak show that Milford Sound is reached. The magnificent scenery of this route, which combines alpine grandeur with delicate forest loveliness, has caused the Milford Track to be entitled "The Finest Walk in the World." The return journey may now be made by the new track to Queenstown.

8.—HANMER SPRINGS

The Hanmer Springs are situated in the south-east of the Nelson province in a portion of the Amuri Plains. Since the establishment of a Sanatorium here by the Government, the spot has become a favourite resort. The Springs are 93 miles from Christchurch, and the journey is by train to Culverden (69 miles) and thence by motor-car. The Springs lie on the north-west side of the Hanmer Plains, an extent of pastoral country about 10 miles long and 6 miles wide, situated at an elevation of 1,200ft. above the sea, and almost encircled by high tussock-covered mountains with rocky summits. The scenery is bold rather than beautiful, but the air is specially healthy and invigorating, and the baths and waters are highly beneficial to invalids.

9.—STEWART ISLAND

This Island is becoming an increasingly popular tourist resort. It is reached by weekly (twice weekly in summer) steamer from Bluff to Oban on Half-Moon Bay. The island is hilly, with two high mountains, Mt. Anglem, or Hananui (3,200ft.), and Rakiahua (2,110ft.), and has beautiful forest scenery. Good tracks have been constructed leading through enchanting bush to the various beauty spots. Paterson Inlet and the north coast abound in delightful spots to which water excursions may be made. Excellent fishing is another attraction for tourists.

Part II.

The Commonwealth of Australia

1.—INTRODUCTION

Discovery and Settlement.—French, Dutch, and Portuguese navigators were the first to sight Australia, and traces of their visits remain in certain place-names upon the north, west, and south coasts. In 1642 Abel Tasman, a great Dutch navigator, discovered Tasmania, which he named Van Diemen's Land after the Governor of the Dutch colony at Batavia. In 1770 Captain Cook, who had just completed a six months' survey of the New Zealand coast, discovered and roughly charted the eastern coast of Australia. Mainly as a result of his visit convicts were first sent out from England to Botany Bay in New South Wales, under the charge of Captain Phillip. The first permanent settlement was made by Phillip at Sydney, in 1788, on the magnificent harbour of Port Jackson. Though at first settlement was made by convicts under military rule, the pastoral and agricultural resources of the country soon attracted free settlers, who acted as pioneers in opening up the new land. Queensland was first settled in 1824. Victoria was settled in 1834 by emigrants who came overland from New South Wales or oversea from Tasmania. In 1829 the first settlers landed in Western Australia. In 1836 the colonisation of South Australia was begun by a British company. The transportation of convicts ceased in 1840. In 1851 the first discovery of gold took place in Australia at Bathurst, and in the years that followed the population went up by leaps and bounds. In the same year Victoria was separated from the mother colony, New South Wales, and eight years later Queensland was also taken from her. Tasmania first became a convict settlement in 1803, and transportation thither did not cease till 1853.

Government.—Australia is one of the most important of the five "self-governing Dominions," which form the highest type of British colonies. In 1901 the six colonies of Australia (New South Wales, Victoria, Queensland, South Australia, Western Australia and Tasmania) united to form a Federal Commonwealth, under the title of the Commonwealth of Australia.* The Federal Government consists of a Governor-General, a Senate, and a House of Representatives, elected by the people of the Commonwealth. Each state has, in addition, its own Governor and State Parliament, consisting of two Houses, a Legislative Council,† and a Legislative Assembly. In 1906 the Federal

*New Zealand was asked to join, but for obvious reasons declined.
†In Queensland the Legislative Council has been abolished.

Government undertook the administration of Papua, and in 1910 it took over the government of the Northern Territory from South Australia. In 1914 Norfolk Island, formerly a separate Crown colony, was taken over by the Federal Government. The respective powers of the Federal Government and the State Governments are specified in a document called the Constitution.* The federal capital is now in course of construction at **Canberra**, situated near Queanbeyan, 204 miles south-west of Sydney, in a tract of territory about 900 sq. miles in extent, which was ceded to the Commonwealth by the government of New South Wales. The Duntroon Royal Military College is situated here. The site for a Commonwealth port was also ceded on Jervis Bay. The estimated population of Federal Territory on December 31st, 1923, was 2,622. Since the War the German Pacific colonies, viz., German New Guinea, the Bismarck Archipelago (New Britain, New Ireland, and New Hanover), and the Solomon Islands, which were occupied by Australian forces in 1914, have come under Commonwealth rule.†

Area and Boundaries.—The mainland of Australia has an area of nearly 3,000,000 square miles. This is about three-quarters of the area of Europe, four-fifths of the area of Canada, about a quarter of the area of the whole British Empire, and about thirty times the area of New Zealand. It is probable that Tasmania and New Guinea once formed part of the mainland of Australia, for they both stand on the continental shelf of Australia.

Australia lies to the south-east of Asia, and is bounded on the north by Torres Strait and the Arafura Sea, on the west by the Indian Ocean, on the south by the Southern Ocean, including Bass Strait, and on the east by the South Pacific Ocean, including the Tasman Sea.

2.—OUTLINES OF PHYSICAL GEOGRAPHY

Relief.—Australia was once a land with lofty alpine ranges extending from the south-east across the centre to the north-west, and at a later date with a lofty snow-clad mountain chain extending from Cape York to Victoria. In the ages that have elapsed since then, these ranges have been worn down till only the stumps remain, and the later sinking of large earth-blocks across the direction of the old mountain lines has resulted in the formation of high plateaus, wide lowland basins, long river valleys, and narrow coastal plains; so that now Australia is a large, low, plateau-land. Its highest

*See "The Australian Citizen," by Professor Walter Murdoch.
†See page 210.

peak, Mt. Kosciusko, 7,330 ft., is little more than half the height of the highest peak in any other continent, and is much lower than the summits of New Zealand and New Guinea ranges.

The geographical subdivisions of Australia are:—

(1) The narrow **coastal plains** of Queensland, New South Wales, and Western Australia.

(2) **The East Australian Highlands** extending south in a belt varying from 100 to 200 miles wide from Cape York to the west of Victoria. This is the wet region of Australia, and so is cut up into deep gorges and steep ridges.*

(3) **The Great Plains** of the interior. These lie to the west of the highlands and extend south from the Gulf of Carpentaria to the Southern Ocean on the coasts of Victoria and eastern South Australia. These plains include the basins of the Flinders and Leichhardt rivers, Lake Eyre, and of the Murray and the Darling.

(4) **The Western Plateau** forms the western half of Australia. The surface of the plateau is gently undulating. Its relative smoothness is due to the lack of rain and the prevalence of hot winds. In South Australia the plateau is separated from the great plains of New South Wales by the Great Rift Valley of South Australia, including Lake Torrens and Spencer Gulf, and the South Australian Highlands lying to the east of the Rift Valley. In the south the Great Australian Bight seems continued far inland into the plateau in the Nullarbor Plains.

Climate.—Australia stretches through nearly 35° of latitude and has highlands reaching to a little over 7,300ft., so that the climate of different districts varies from tropical to alpine temperate. The northern portion of Queensland, Northern Territory, and Western Australia, amounting to nearly $\frac{5}{13}$ of the whole area, lies within the tropics, but is not so hot as might be expected,

*For the most part mines occur where weathering agents, particularly rain or running water have cut into the soil and laid open the mineral wealth.

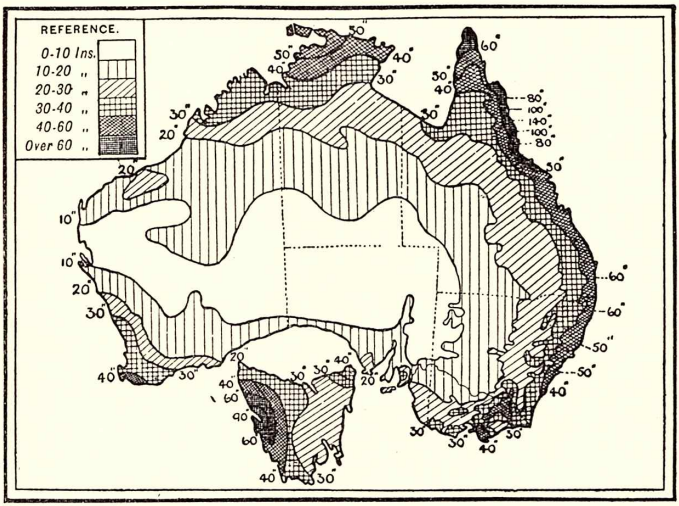
as the chief winds come off the sea. Australia's insular position and the absence of lofty mountain ranges make her climate more temperate than other regions of like area in the same latitude in other parts of the world.

A general idea of the climate of the most thickly peopled parts of Australia may be gathered from the following table. These figures should be compared with those given for New Zealand on pages 50-54. The percentage of moisture in the air gives the amount actually in the air as compared with what it would hold if saturated. It will be noticed that Brisbane has the highest temperature and Adelaide the lowest rainfall, while the climate of Sydney is particularly hot and moist.

	Perth	Adelaide	Brisb'ne	Sydney	Melb'ne	Hobart
Mean annual temperature	64°	63°	69°	63°	58°	54°
Mean annual rainfall	33½in.	21in.	47in.	48in.	26in.	23in.
Percentage of moisture in the air	63%	56%	68%	73%	71%	71%

In Australia, as in other continents, the difference between highest and lowest temperatures increases in proportion to distance from the coast. In the interior the temperature rarely rises above 120° in the shade even in dry summers, while in dry winters frosts occur over the southern half of the continent. The hottest area is in the north of Western Australia, and the coldest part is the region of the Australian Alps where 100° is an extreme summer temperature. Snow and hail fall at times, the former in winter and the latter also in summer, over the southern half of the continent or up to the latitude of Toowoomba in Queensland. Snow lies even in mid-summer in ravines on Mt. Kosciusko.

The **rainfall** depends to a great extent on the direction and nature of the prevailing winds, the temperature of the land over which they blow, and the position and height of the mountain chains. The south-east trade wind coming off the Pacific Ocean strikes the north-east coast to the north of the Clarence River and drops most of its moisture on the Queensland ranges of



After H. A. Hunt, Com. Met.

Map showing mean annual rainfall of Australia.

the Great Divide. The same wind, after blowing across the interior of the continent, reaches the north-west of Western Australia with but little moisture left, so that the lowest rainfall occurs on the Great Western Plateau and around Lake Eyre. In the south of the continent westerly trade winds prevail, and these give the regular though light westerly rains that come to the south-western region of Western Australia, the south-east of South Australia, as well as most of Victoria and Tasmania.

The wettest known region of Australia is on the north-east coast of Queensland, where the rainfall ranges from 70 inches to occasionally over 200 inches a year.* At

*Harvey Creek, Goondi, and Innisfail have the highest rainfall in Australia. Max. records 254 in, 241½ in., and 211¼ in. respectively.

Mt. Lyell in Tasmania the average is 116 inches. The driest known part of the continent is the Lake Eyre district in South Australia, which is below sea-level and where the rainfall averages only 5 inches.

Besides the trade winds already referred to, the winds of Australia include the monsoons* of the north, land and sea breezes of the east and west coasts, cyclones or storm winds of the north-west coast, southerly bursters (cool or cold winds following hot weather in the south-east of Australia), as well as hot winds similar to the nor'-westers of Canterbury and called "brick-fielders" in Victoria.

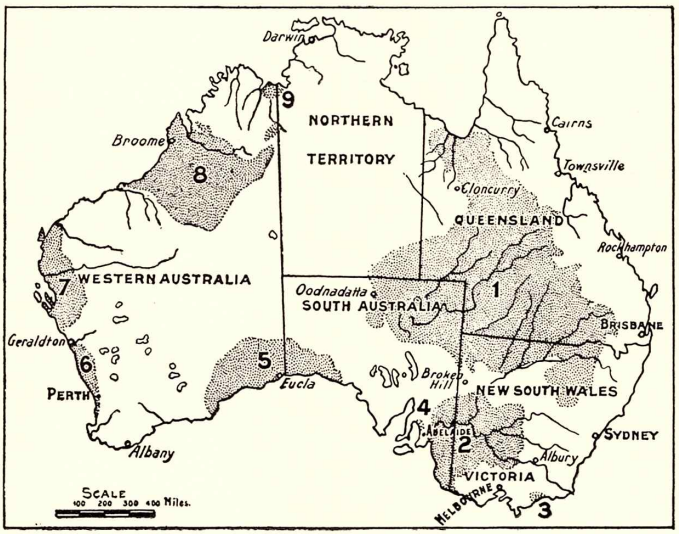
Water-supply and Irrigation.—As the greatest enemy of the Australian farmer is drought, the question of water conservation and irrigation is of special importance. In the drier regions water is collected in ponds, dams, or reservoirs called "tanks." Large areas in Australia are well supplied with underground water, and the sinking of artesian wells during the past thirty years has vastly increased the stock-raising capabilities of the districts where they occur. The regions where such water may be obtained by boring are: (1) the Great Australian Basin underlying parts of four states†; (2) the Murray River Basin; (3) the Sale (Gippsland) Basin; (4) the Adelaide Plains Basin; (5) the Eucla Basin; (6) the Western Coastal Plain Basin; (7) the North-west Basin; (8) the Desert Basin; and (9) the Cambridge Gulf Basin. There are upwards of 5,150 artesian bores in use in these regions. Unfortunately, most of the artesian water of Australia is more or less brackish, and hence it varies in utility in different localities.

A great number of irrigation schemes have been proposed to assist cultivation and promote closer settlement in different parts of the eastern states. Two of the most successful are the fruit-growing settlements of **Mildura** (founded 1887), on the Murray in Victoria, and **Ren-**

*See page 21 and page 181.

† Queensland, New South Wales, South Australia, and Northern Territory.

mark in South Australia. Most of the schemes are in connection with the Murray River or one of its tributaries. In New South Wales the most important is the Murrumbidgee Irrigation Scheme. By constructing a weir, known as the Burrinjuck Dam, across the Murrumbidgee an immense volume of water is collected from winter rains and melting snows, enough to maintain a



From Commonwealth Official Year Book.

Map of Artesian Basins in Australia.

steady flow of water in the river during the dry summer months when irrigation is most needed. From here the water passes 200 miles down the river to the Berembed Diversion Weir, by which it is turned into canals and channels as required to irrigate the lands to the west of Narrandera.

Ultimately over 200,000 acres under irrigation by gravitation, and served by railways, will be leased in blocks of 50 to 200 acres for fruit and vegetable growing, dairying, and stock-raising. The fruits grown include stone and pip fruits, citrus fruits, raisins, sultanas, figs, and olives, besides wine and table

grapes. In 1923 there were 2,064 farms comprising 119,609 acres in occupation, the population numbering about 12,000 persons. At present the settled areas are near Yanco Siding, Griffith, and Leeton. The first-named has an electric power station, a bacon factory and abattoirs, the second has a cheese factory, and the last an up-to-date butter factory.

The largest of the Victorian enterprises is the **Goulburn** Scheme, which serves to irrigate 870,000 acres in the valleys of the Goulburn, Campaspe, and Loddon Rivers, a region of low annual rainfall (18 inches), where lie the settlements of Shepparton, Tongala, Rochester, Echuca North, Dingee, Rodney, and Tragowel Plains.

As the shallowness of the lower Murray in summer, due to lessened rainfall and increased evaporation, has in the past impeded navigation and checked irrigation, the three States of New South Wales, Victoria, and South Australia in 1917 initiated a group of schemes to regulate the flow of water in the river by storing it in the rainy season and releasing it in the dry season. New South Wales and Victoria are undertaking to provide for the Upper Murray storage by the construction of the Hume reservoir below the junction of the Mitta Mitta with the Murray, and South Australia has undertaken to construct the Lake Victoria storage. Twenty-six weirs and locks in the Murray and nine in the Murrumbidgee will be necessary to control the current for navigation and other purposes. The Hume reservoir, when full, will have a surface area $2\frac{1}{2}$ times as large as Sydney Harbour. Its waters will also be used for hydro-electric generation. Already 340,000 acres are served by these schemes.

A great irrigation project now under construction in Queensland is the **Dawson Valley** scheme, which is designed to water an area of 200,000 acres in a fertile coastal region to the south-west of Rockhampton. The main storage dam is situated in Nathan's Gorge, and an offtake weir 27 miles down stream is to control the diversion of water for irrigation purposes. The flow of water at the weir is to be used to generate electricity to supply the whole area with power.

Natural Regions.—Dr. A. J. Herbertson has divided the world into regions of similar climate and products. The natural regions of Australia, as shown in the map on page 21, are adapted from Dr. Herbertson and Dr. Griffith Taylor.

(1) **Tropical Insular Highlands or Malay Type.**—The Malay Peninsula and most of the East India Islands, including Northern Papua, comprise a region of tropical forest, the land when cleared being suitable for the cultivation of coffee, sugar, spices, sago, and other tropical products.

(2) **Monsoon Summer Rain—Coastal Region.**—The typical monsoon land is India, where seasonal winds called monsoons prevail. In winter, which is the dry season, the winds blow out to sea, and in the summer, the wet season, they blow in from the Indian Ocean. The Australian region of this type borders on Torres Strait and the Arafura Sea. As it lies in the Southern Hemisphere its wet season, when the north-west monsoon prevails, is from October to April, and the dry season, when the south-east monsoon prevails, is from April to September. The natural products of this region are cotton, tobacco, sugar, coco-nuts, and other tropical fruits.

(3) **Summer Rain, Interior—Sudan Region.**—This is an inland sub-tropical upland region bordering on desert. The plant life is of the savana type,* and bananas, pineapples, and other fruits, sugar, coffee, cotton, and tobacco grow in the lower lands.

(4) **The Sahara Region.**—Most of the interior of Australia is desert similar to the Sahara Desert of Africa. Much of it is sandy or stony and without vegetation, though thousands of square miles are covered with spinifex, a prickly plant of no value as food for stock.

(5) **The China Region.**—This region comprises the more populous portions of Queensland and New South Wales. It is situated on an eastern seaboard and enjoys

*Low vegetation or grasses.

a warm temperate climate with an ample rainfall, most falling in summer. Dairying and the raising of crops form the chief occupations of the people. Similar regions elsewhere are China and the Eastern United States.

(6) **The Riverina.**—This name has long been applied to the rich pastoral plain lying between the Murray River and the Darling. Mr. Taylor extends it to the whole western region of New South Wales and the lower basins of the Murray and its great tributaries the Darling, Lachlan, and the Murrumbidgee. It is an interior lowland region with a warm dry climate well suited for the production of wool and wheat. Similar regions are to be found in the prairies* of North America, the pampas* of South America, and the plains of Southern Siberia.

(7) **The Mediterranean Region.**—This region is similar to the Mediterranean countries of Europe, and the Cape of Good Hope, which enjoy a warm, temperate climate with the greatest rainfall in winter. Two examples of this region occur in Australia, viz., (1) the west and south-west of Western Australia, and (2) Victoria with the southern portion of South Australia. The special products of this type of region are olives, figs, oranges, apricots, wine, cattle, wheat. The North Island of New Zealand is of this type.

(8) **West European Region.**— Tasmania enjoys similar conditions to those found in West Europe and British Columbia, viz., a cool, temperate climate, with considerable rainfall and snow not uncommon. The chief products are sheep, fruit, and timber. The South Island of New Zealand is of this type.

Native Flora.—Australia is of great extent, and different parts are sufficiently varied in elevation, temperature, rainfall, distance from the sea, and in nature of soil to exhibit great variety in their plant life. Desert plants, pasture grasses, shrubs, and forest trees are all represented. The latter include acacias (wattles) valuable for gum and bark, and a great

*Treeless, grassy plains.

variety of hardwoods, viz., ironbark, stringy bark, black-butt, (all of the eucalyptus or gum family), and red mahogany. Good sandalwood is obtained in Yorke Peninsula (S.A.), while jarrah and karri (noted for strength and lasting qualities) flourish in Western Australia, and the Huon pine in Tasmania. Tree ferns and palms are the most graceful plants of the Australian bush.

*Native Fauna.—The animals of Australia are even more peculiar to herself than her plant life. Marsupials or pouched mammals are found in great variety, the chief of which are kangaroos, wallabies, wallaroos, opossums, wombats, bandicoots, the koala or native bear, and the Tasmanian devil. Other strange animals are the platypus and the echidna. Apart from crocodiles and numerous varieties of snakes (some venomous), iguanas, and lizards, the dingo or wild dog is the chief beast of prey. Birds and insects exist in wonderful variety and beauty of colouring. The former include the emu, the laughing jackass, the lyre bird, the bower bird, black swan, parrots, cockatoos, etc.

3.—OUTLINES OF ECONOMIC GEOGRAPHY

Population.—Like the people of New Zealand the inhabitants of Australia are mostly of British descent. According to the estimate of 1924 the population of Australia is nearly $7\frac{3}{4}$ million. This gives an average of 1·9 per square mile, the lowest of any civilised country in the world. The total annual increase in population during the years 1921-1923 (obtained by combining the natural increase with the net immigration) averaged 112,836. The total number of aborigines is said to be under 60,000.

The greater part of the population is gathered within a hundred miles of the coast on the east, south-east, and south-west, and over 62 per cent. of the Australian population is urban. It is difficult to imagine that the interior desert of Australia will ever support a population; and the tropical portions of the far north, even though fertile, seem unsuited for white people to live in. Thus we may divide Australia roughly into five parts on the basis of the density of population: (1) barren desert; (2) pastoral areas; (3) agricultural

*Name some plants and animals introduced into Australia but not into New Zealand.

areas; (4) mining areas; (5) capital cities. The uneven distribution of population in the Commonwealth may be accounted for by the following causes:—

(1) Harbours were naturally first settled as they afforded safe landing and anchorage and ready communication with the sea by which in those early days all food supplies came. These settlements had the advantage of an early start. The capital cities are the mothers rather than the daughters of their respective States.

(2) The number of good harbours is small compared with the great extent of the country. These secured and maintain almost a monopoly of foreign trade.

(3) The country is unevenly productive, that is, some parts are very rich while large areas are quite barren. This is often due more to unfavourable climate—intense heat, insufficient rainfall, and occasional drought—than to actual poverty of soil. This disadvantage is now being met in several ways, (*a*) by boring, that is, sinking pipes to tap Australia's enormous artesian water supply with which to water stock and to irrigate the land; (*b*) by building dams and weirs to store river water for irrigation, as is being done in the Murray; (*c*) by dry farming, that is, adopting methods that have been found best on land with a very low rainfall.

(4) From the first the capital cities have been the centres of the road and railway systems, and being seaports have controlled the distribution of imports. This control has been jealously guarded by city merchants.

(5) The interior is lacking in facilities for transport.

(6) Manufacturing is in its infancy in Australia, and the tendency has been to start industries in the capital cities owing to the advantages they possess for obtaining raw materials and machinery, and for the sale or export of goods.

Up to 1923 upwards of 3·8 million acres of land had been allotted by the State Governments in Australia for purposes of closer settlement. In the extension of this system lies the only hope of adding greatly to the rural population of Australia.

Transport.—The modes of transport are similar to those of New Zealand already detailed, with the addition of the camel transport* of the interior deserts. The rivers of Australia are defective for internal communication owing to shallow outlets, *e.g.*, the Murray, or to uncertain depth of water. The Clarence River is navig-

*There were over 11,000 camels in Australia in 1922-23.

able as far as Grafton. The Murray, with its tributary the Darling, is the principal interior waterway, and extensive works are already in hand to increase its usefulness in this respect. Australia is therefore dependent chiefly upon her **railway systems**, the main lines of which follow the east, south, and south-west coasts, with branches extending therefrom into the interior. The result is to link together all the ports and larger towns and to connect these with the centres of population in their respective hinterlands. These railways, however, suffer from certain disadvantages, viz.:—

(1) The great extent of the country and hence the amount of construction required to connect widely separated centres of population. The longest stretch of railway in Australia runs from Dajarra in north-western Queensland through Cloncurry, Townsville, Rockhampton, Brisbane, Newcastle, Sydney, Albury, Melbourne, Adelaide, Port Augusta, Kalgoorlie, Perth, Geraldton, to Meekatharra, in Western Australia, a distance of nearly 5,000 miles. The Trans-Australian railway from Port Augusta to Kalgoorlie was opened in 1917. The main inter-state line from Brisbane to Perth, connecting five capital cities, is 3,475 miles long, the western journey occupying over 6 days, and the eastern journey 5¾ days. Victoria and Eastern New South Wales are well served by railways, and construction is going on rapidly in many other parts of the country. The completion of the line from Trida to Menindie will forge another link between New South Wales and South Australia. An ambitious project is to link up the western termini of the Queensland branch railways; and yet another is to connect Oodnadatta through Alice Springs, Daly Waters, and Mataranka with Emungalan (Katherine River), and so link up the north and south coasts of the continent.

2. The want of uniform railway gauge* (width between rails) in the several states. A change of gauge necessitates transhipment of goods and passengers and so adds greatly to the cost of transport. The estimated cost of converting the whole of the lines to a uniform gauge exceeds £57m.

The **principal steamer** routes to and from Australia have already been referred to. They are:—

1. **Intercolonial.**—The Union S.S. Company and Huddart Parker routes connecting with New Zealand, and various steamer routes connecting with the Pacific Islands.

*Of five gauges in use the chief are 3ft. 6in., 4ft. 8½in., and 5ft. 3in.

2. **Foreign.**—(*a*) The three routes *viâ* America, viz., Sydney, Auckland, Vancouver; Melbourne or Sydney, Wellington, San Francisco; Melbourne or Sydney to Auckland or Wellington, thence *viâ* Panama to Southampton or London.

(*b*) The eastern route *viâ* east coast ports, Thursday Island, Manila, Hong Kong, Shanghai, and Yokohama.

(*c*) The Suez route *viâ* south coast ports, Fremantle, Colombo, etc., which is about 400 miles shorter than the route from Sydney to London *viâ* Panama Canal.

(*d*) The Cape of Good Hope route (the chief cargo route) *viâ* Durban, Cape Town, etc., to the United Kingdom and to New York. Distance, London to Fremantle *viâ* Cape, 10,800 miles. Time taken, 36 days. Distance, New York to Fremantle *viâ* Cape, 11,500 miles. Time taken, 38 days.

Communication.—We have seen that the mail and telegraph services of New Zealand are closely linked with those of Australia.

Postal.—The Commonwealth Mail Services include those already described on page 120. In addition, the 'Frisco route is followed by the Oceanic Steamship Co., which despatches mail steamers twice in nine weeks *viâ* Sydney, Pago Pago, and Honolulu. The Suez route is followed by mail steamers of the Orient Steam Navigation Co.: Brisbane, Sydney, Melbourne, Adelaide, Fremantle and London (*viâ* Naples and Toulon), and the Peninsular and Oriental Steam Navigation Co. Ltd.: Sydney, Melbourne, Adelaide, Fremantle and London (*viâ* Marseilles). Several services (*e.g.* Burns, Philp and Co., China Navigation, Nippon Yusen Kaisha, etc.) carry mails from Sydney *viâ* Queensland ports to various ports in the East. Average time, London to Sydney *viâ* Vancouver, 39 days; *viâ* San Francisco, 43 days; London to Fremantle, 27 to 28 days.

Aerial Mail Services.—The following services have been established:—

(1) Perth to Wyndham, Western Australia, a flying distance of 2,884 miles; weekly return service. Landing places en route are Geraldton, Carnarvon, Onslow, Roebourne, Port Hedland, Broome, and Derby.

(2) Charleville to Cloncurry, Queensland, a distance of 560 miles, to link up the western railway terminals. Landing places are Charleville, Tambo, Blackall, Longreach,

Winton, McKinley, and Cloncurry. Weekly return service.

(3) Adelaide-Sydney, and Sydney-Brisbane services. A weekly service each way is aimed at. Landing places are Mildura, Hay, Narrandera, Cootamundra, Sydney, Newcastle, Grafton, and Bellina.

Among other services proposed is one between Oodnadatta and Alice Springs. (See page 185.)

Telegraphic.—Land **telegraph** wires almost encircle Australia, for wires run right round the east, south, and west coasts to Wyndham in the north-west. All the more important towns and townships have connection with this line. From Adelaide, the transcontinental telegraph line crosses the heart of Australia to Darwin, whence a cable runs to Europe *viâ* Banjoewangie, Singapore, Madras, etc. The **cables** connecting Australia and Europe are:—

(1) The Pacific Cable (see p. 124).

(2) Eastern Extension Company's Cables:—"*Viâ* Eastern" messages are automatically transmitted from Australia to London and *vice versâ*. For example, a slip is punched in Sydney, and this punched slip is reproduced at certain stations *en route* and finally converted automatically into type. The routes from Sydney *viâ*" Eastern" are:—

(*a*) Cape Town Route:—
Viâ **Adelaide**, Perth, **Cocos**, Rodriguez, Mauritius, **Durban**, Cape Town, St. Helena, Ascension, **Cape St. Vincent**, Portheurnow (Land's End), London. (The black type indicates the only stations at which messages have to be automatically reproduced.)

(*b*) Suez Routes:—
Seven routes are available, including:—
1. *Viâ* Adelaide, Cocos Island, Singapore, Colombo, Aden, Suez, London.
2. *Viâ* Adelaide, Darwin, Banjoewangie, Singapore, Madras, Bombay, Aden, Suez, London.
3. *Viâ* Adelaide, Darwin, Singapore, Colombo, Aden, Suez, London.
4. *Viâ* Darwin, Singapore, Colombo, Seychelles, Aden, Suez, London.

(*c*) **Trans-Asiatic Route.**—The route *viâ* China and Vladivostok is not used for traffic from Australia and New Zealand, but is available if all other routes fail.

It is worthy of note that remarkable progress has been made in submarine telegraphy in recent years.

Wireless telegraph stations are in operation at the following places:—

Port Moresby, Thursday Id., Cooktown, Townsville, Rockhampton, Brisbane, **Sydney**, Flinders Id., Melbourne, Hobart, King Id., Adelaide, Esperance, **Perth**, Geraldton, Broome, Wyndham, **Darwin**, and Samarai. In the Pacific the Commonwealth has stations at Aitape, Kavieng, Kieta, Madang, Manus, Morobe, and Rabaul. Those in heavy type are high-power stations. The nearest outside stations are Cocos Island, Singapore, and Suva.

It is anticipated that early in 1926 Marconi beam stations, to be erected near Ballan (for transmitting) and near Sydenham (for receiving) in Victoria, will be in operation and communicating with reciprocal stations in Canada (near Montreal) and England, as links in an Empire wireless chain.

PRODUCTS AND INDUSTRIES.

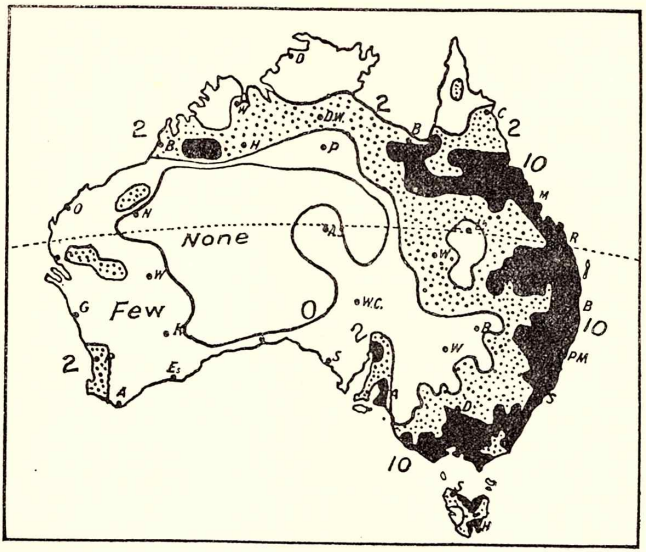
Animal Products.—Sheep, cattle, horses, pigs, wool, tallow, hides, butter, cheese, condensed milk, frozen meat, bacon, fish, pearls, pearlshell, bêche de mer (trepang).

The estimated number of live stock in the Commonwealth in 1922 was about 78·8m. sheep*, 14·3m. cattle, 2·3m. horses, and nearly 1m. pigs. Australia is the largest wool-producing country in the world,† the value of the 1922-23 clip being £49m. About 8% of the clip supplies the requirements of local mills. New South Wales is the leading sheep state, and Queensland the chief cattle and horse state, though the south-eastern states have most of the dairy cows. In 1922-23, 24% of the value of Australian production was classed as pastoral. This was exclusive of dairying, which comprised about 10% of the total. Of the latter industry butter is the principal product, condensed (or concentrated) milk ranks second, and cheese third. In 1922 Victoria made the bulk of the butter, and also of the condensed milk, and Queensland most of the cheese. In the same year the production of bacon and ham amounted to 62m. lbs.

Vegetable Products.—(*a*) Sub-tropical: Cotton, sugar, tobacco, maize, fruits, wine, timber, sweet potatoes. (*b*) Temperate: Wheat, oats, barley, rye, hay, grass-seed, farm roots (potatoes, onions), European fruits, timber.

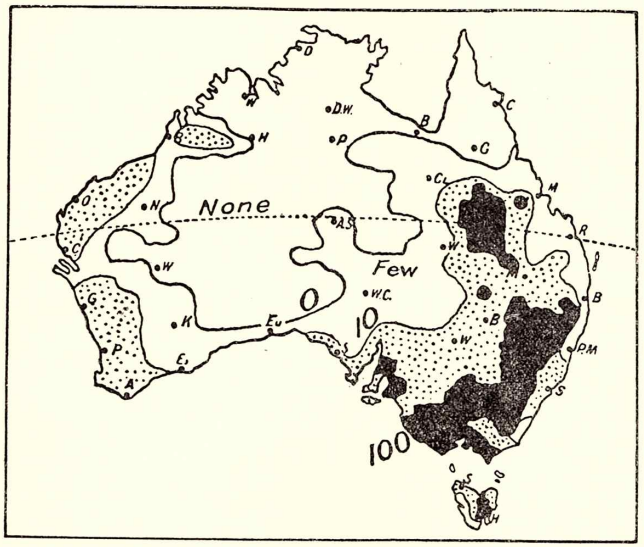
In 1922-23, 22% of the value of Australian products was classed as agricultural. The 16½m. acres devoted to crops in 1922-23 represented less than 1% of the total area of the Commonwealth. The leading agricultural States are Victoria, New South Wales and Western Australia. Wheat is by far the most important crop in Australia, the area under cultivation

*Cf. the record number of 106m. in 1891. See also page 65.
†Her keenest competitor is Argentine Republic.



From Bulletin No. 11, Com. Bur. of Met.

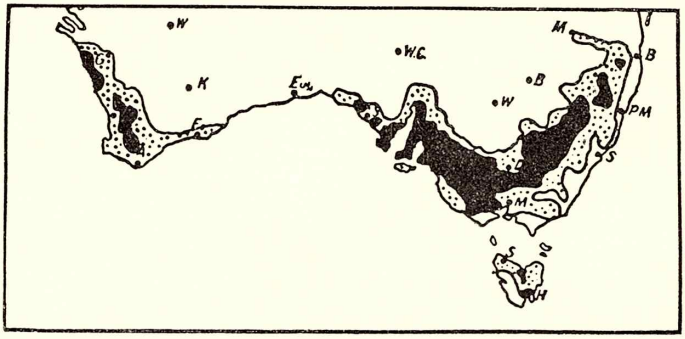
Distribution of **cattle** in Commonwealth. Map shaded according to density; black, dotted, few and none. Most cattle in the wetter coastal belt.



From Bulletin No.11, Com. Bur. of Met.

Distribution of **sheep** in Commonwealth. Map shaded according to density black, dotted, few and none. Most sheep in warm inland drier belt.

being about 9¾m. acres. It is not, however, the most fertile land that is used for wheat. The yield fluctuates greatly from year to year, owing to variations in the area under crop and in the amount of rainfall. The crop in 1922-23 was 109m. bush., and in 1918-19 only 75m. bush. As already stated (page 81), the average yield per acre is low: for the ten seasons 1913-23, 11·2 bush. Victoria, New South Wales, South Australia, and Western Australia are the chief producing States. Among other vegetable products, sugar-cane is grown in Queensland and New South Wales, and sugar-beet in Victoria. The production of cotton, confined to Queensland, is increasing, but that of coffee in the same State is declining. Tobacco is grown in the three



From Bulletin No. 11, Com. Bur. of Met.

Distribution of wheat in the Commonwealth. Black indicates principal wheat area. An extension may be anticipated in the future into east-central Queensland, a region resembling the wheat area around Delhi and Lucknow in Northern India.

eastern States, and chiefly in New South Wales, but foreign tobacco is preferred, and so is largely imported raw and manufactured in Victoria and New South Wales.

Mineral Products.—The mineral output in Australia shows a declining tendency owing to the high cost of production, the deterioration in ore values, unsatisfactory labour conditions, and other causes.

In 1922-23 only about 5·3% of the value of Australia's products was classed as mineral. In 1922 the value of the total mineral output was £20m. The chief minerals produced were coal (£10·4m.), gold (£3·5m.), silver-lead (£2·2m.), zinc (£1m.), copper (£·8m.), lead (£·4m.), tin (£·39m.), and iron (£·2m.). Of the coal output, New South Wales supplied £8·5m. or ⅘ths, and Queensland and Victoria most of the remainder. The value of the gold yield in 1922 was only 5% of the world's production, and was the lowest recorded since the discovery of the

metal in 1851. The leading producers were Western Australia (5-7ths), Victoria (1-7th), Queensland and New South Wales. All the States produced silver and lead, New South Wales (£2·5m.) producing more than all the rest combined. The amount of silver produced was 6% of the world's production. Zinc to the value of £1m. was produced entirely in New South Wales (Broken Hill). The marked decline in the production of copper was due to the low market price of that metal. Of the total output in 1922, Tasmania and Queensland produced 7-8ths. Victoria is the only State yielding no copper. A similar decline took place in the production of tin, the leading producers being New South Wales and Tasmania. South Australia is the only State yielding no tin. Iron and steel are produced almost entirely in New South Wales at Lithgow from deposits of ore at Tallawang and Cadia; and at Newcastle from ore mined in South Australia. (See pp. 197 and 206.) Salt is produced chiefly in South Australia.

*Industries.—Pastoral: Stock and dairy farming; agricultural: wheat, oats, and maize growing, cultivation of cotton, sugar, coffee, and tobacco, fruit growing, drying, and preserving; also mining, quarrying, sugar refining, fisheries, and the manufacture of condensed milk, flour, wine, woollens, leather, boots and shoes, soap and candles, tobacco, iron, motor bodies, machinery, and implements.

Trade and Commerce.—There is free trade between the six states of the Commonwealth, but duties are charged on many goods imported from abroad. They are higher† on certain goods produced in foreign countries than on similar goods produced in certain parts of the British Empire. There is legislation to repress monopolies that are in restraint of trade or detrimental to the public interest. The following table shows the oversea trade of the Commonwealth in recent years:—

OVERSEA TRADE OF THE COMMONWEALTH.

Year	Imports	Exports‡	Total trade	Excess of Exports ¶
1918–19	£102,335,000	£113,964,000	£216,299,000	£11,629,000
1919–20	£98,974,000	£149,824,000	£248,798,000	£50,850,000
1920–21	£163,802,000	£132,159,000	£295,961,000	–£31,643,000
1921–22	£103,066,000	£127,847,000	£230,913,000	£24,781,000
1922–23	£131,758,000	£115,870,000	£249,628,000	–£13,888,000

*Unlike New Zealand, Australia is lacking in water-power. See p. 209. She has, however, upwards of 250 works which generate electricity for lighting and power. Most are in New South Wales and Victoria, *e.g.*, at **Yallourn** (on the brown coal fields of Gippsland), which supplies Melbourne and other towns.

†Called preferential duties. (See p. 130.)

‡The totals in this column do not include ships' stores which in 1922-23 amounted to £2·8m. including £1·9 m. for bunker coal.

¶See also page 125.

Explanation of Table:—(*a*) The expansion of oversea trade in 1918-19 was due to improved shipping facilities and to higher prices. (*b*) The high value of exports in 1919-20 was due much more to higher prices than to the increased quantity of goods exported. (*c*) The decline in the value of exports in 1920-21 was due to reduced exports of wool at lower prices, and to smaller exports of meats, flour, etc. As a set-off against these there was an increase in the exports of wheat of nearly £12m. and of butter of nearly £8m. (*d*) Though the value of exports in 1921-22 was lower than in the two previous years the quantity exported was much greater. (*e*) The exports for 1922-23 were lower in quantity as well as in value than in the immediately preceding years. (*f*) The exceptional increase in imports in 1920-21 was due to the high prices of commodities and to the unexpected fulfilment of long-standing orders by British merchants who, owing to the trade depression at Home, seized the opportunity to devote their attention to Australian orders. The result was a large excess of imports over exports. (*g*) Trade in 1921-22 showed a temporary return to normal conditions, the decline in imports being due partly to the exceptional importations of the previous year and partly to the lower prices of commodities. (*h*) In the following year, however, imports were again in excess. The heavy decline in the export of wheat and the smaller figures for flour and butter were responsible for this. The position would have been much worse but for the high value of the wool export, viz., £57m.

In 1922-23 52% of the Commonwealth import trade and 44% of her export trade was with the United Kingdom. Adding to this the trade with other British countries (chiefly India, New Zealand, Ceylon, Canada, Malaya, and South Africa), we find that a total of 64% of her import trade and over 57% of her export trade was with the British Empire. About 1½% of her import and 3½% of her export trade was with New Zealand. Omitting the United Kingdom, the United States, Canada, India, Netherlands East Indies, Japan, France, Switzerland, and New Zealand supplied the bulk of the imports, and France, the United States, Japan, Italy, Belgium, New Zealand, Germany and India took the bulk of the exports. There is evidence that the United Kingdom is regaining the trade lost during the war period. The percentage of imports from all British Possessions except Canada is declining, as are the percentages from United States and Japan. Trade with Germany was first freely resumed in 1922.

A decreasing proportion of Australian exports go to the United Kingdom. This is partly due to direct shipment of wool to the consuming countries—viz., Belgium, France, and Germany. Large quantities of Australian produce, however, are still distributed from London.

Imports (1922-23).—Total, £131·7m. The classes and values of the principal imports in 1922-23 were:—(1) Apparel, textiles, etc., £44·5m.; (2) metals, metal manufactures, and machinery, £35·2m.; (3) paper and stationery, £6·2m.; (4) oils, fats and waxes (including benzine and kerosene), £5·9m.; (5) vegetable foodstuffs (sugar, rice, etc.), non-alcoholic beverages (tea, cocoa beans, coffee and chicory), etc., £5·5m.; (6) wood and wicker (including timber), £4·7m.; (7) drugs, chemicals and fertilisers, £3·8m.; (8) vegetable substances and fibres (including copra, linseed, flax, hemp, gums), £2·8m.; (9) rubber, leather, etc., £2·6m.; (10) jewellery, time-pieces, etc., £2·4m.; (11) tobacco, etc., £2·2m.; (12) earthenware, china, glass, etc., £2·2m.; (13) alcoholic liquors, etc., £1·8m.; (14) animal foodstuffs, £1·7m.; (15) optical, surgical, and scientific instruments, £1·1m.; (16) animal substances, not foodstuffs (including woollen yarns, hides, and skins), £·9m.

Exports (1922-23).—Total, £117·8m. The values of the principal exports in 1922-23 were:—(1) animal substances, etc., £64·3m.; (2) vegetable foodstuffs, non-alcoholic beverages, etc., £17m.; (3) animal foodstuffs, etc., £15·5m.; (4) metals, metal manufactures, and machinery, £5·3m.; (5) gold and silver, and bronze specie, £3·3m.; (6) stones and minerals, etc., £3m.; (7) oils, fats, and waxes, £1·8m.; (8) wood and wicker, etc., £1·1m.; (9) vegetable substances, etc., £1m.; (10) rubber and leather, etc., £·9m.; (11) apparel, textiles, etc., £·7m; (12) tobacco, etc., £·6m.; (13) drugs, chemicals, etc., £·5m.; (14) alcoholic liquors, £·29m.; (15) live animals, £·25m.; (16) paper and stationery, £·24m.

The values of these exports, classified according to industrial origin, were: (1) pastoral, £73m.; (2) agri-

culture, £16m.; (3) mines and quarries, £11m.; (4) dairy and farmyard, £7m.; (5) manufacturing, £4m.; (6) forestry, £1m.; (7) fisheries, £·4m.

Details of Oversea Trade.

(1) **United Kingdom.**—Imports: £68m., including apparel, textiles, etc., £31m.; machinery and metal manufactures, £20m.; also whisky, yarns (woollen and other), china and earthenware, paper and stationery, drugs and chemicals, and vessels.

Exports: £51·9m., including wool, £25·9m.; butter, £5m.; wheat, £2·9m.; also frozen beef, mutton and lamb, cheese, flour, fruits, hides and skins, tallow, leather, copper, lead and zinc.

(2) **United States.**—Imports £24·8m., including tobacco, apparel and textiles, petroleum spirit, benzine, kerosene, oils, machinery, motor cars, metal manufactures, timber, films, fish, sulphur, rubber, and leather.

Exports: £9·6m., including wool, £5m.; rabbit, kangaroo, and opossum skins, £2m.; also pearlshell, sausage casings, butter, coal, and hides.

(3) **Japan.**—Imports £3·9m., including silk goods £1·9m.; cotton goods, £·6m.; also china and porcelain, glass and glassware, timber, fancy goods, and apparel.

Exports: £9·3m., including wool £6m.; wheat, £·9m.; also tallow, lead, zinc, flour, milk and cream.

(4) **India.**—Imports £4·3m., including bags and sacks, £2·6m.; also hessians, rice, tea, hides, linseed, paraffin wax, gums and resins, precious stones, coffee and chicory, and spices.

Exports: £3m., including gold specie, £1·5m.; silver, £1m.; also timber, coal, tallow, preserved meats, preserved milk and cream, and horses.

(5) **Italy.**—Imports £1·1m., including motor chassis £·3m.; also silk goods, nuts, hides, hats, oils, flax and hemp, marble, gloves, and works of art.

Exports: £5·9m., including wheat £3m.; wool £2·4m.; also tallow, hides, and copra.

(6) **New Zealand.**—Imports £2m., including timber £·5m.; also hides and skins, butter, flax and hemp, tow, linseed, fish, horses, and grain and pulse.

Exports: £4·3m. (of which £3m. was Australian produce), including tobacco, £·5m.; coal, £·4m.; apparel, textiles, £·4m.; machinery and metal manufactures, £·4m.; timber, £·3m.; also indiarubber manufactures, leather, fruits, confectionery, and medicines, besides a very wide range of commodities not produced in Australia, such as rice, tea, paints, dyes, glassware, earthenware, etc.

(7) **Netherlands East Indies.**—Imports £4·3m., including petroleum spirit, benzine, etc., £1·8m.; tea, £1·4m.; also kero-

sene, crude petroleum, crude rubber, kapoc, coffee and chicory, spices, and tobacco.

Exports: £1·8m., including flour £.6m.; butter, £.5m.; also preserved milk and cream, coal, leather, bacon and hams, and biscuits.

(8) **Canada.**—Imports £5m., including motor chassis, £1·9m.; also printing and wrapping paper, motor bodies, preserved fish, apparel and textiles, agricultural implements, timber, metal goods, and rubber goods.

Exports: £.3m., including wool, meats, hides and skins, and fruits.

(9) **Germany.**—Imports £.5m.

Exports: £4m., including wool, £3.4m.; beef, hides and skins, copra, lead, tallow, sausage casings, and ores.

(10) **Pacific Islands.**—Imports £1.4m., including copra*, £.6m.; rock phosphates, £.4m.; also sugar, cocoa beans, cattle, and guano.

Exports: £1·6m. (of which £1m. was the produce of Australia), including a very wide range of commodities such as butter, meats, biscuits, flour, rice, sugar, potatoes, tea, ale and porter, spirits, tobacco and cigarettes, boots, canvas and duck, kerosene, coal, timber, and soap.

The following table shows the relative position of the six States of the Commonwealth as regards trade in 1922-23:—

SUMMARY OF COMMONWEALTH TRADE, 1922–23.

State.	Import.	Export.	Total.
New South Wales	£55 million	£42·5 million	£97·5 million
Victoria	£46·7 ,,	£33·7 ,,	£80·4 ,,
Queensland	£10·7 ,,	£15·7 ,,	£26·4 ,,
South Australia	£10·8 ,,	£13·5 ,,	£24·3 ,,
Western Australia	£6·7 ,,	£9·6 ,,	£16·3 ,,
Tasmania	£1·5 ,,	£2·4 ,,	£3·9 ,,
Northern Territory	£0·012 ,,	£0·014 ,,	£0·026 ,,

From this table it will be seen that the Mother Colony, New South Wales, has the largest trade, Victoria ranks second, and Queensland third. A comparison with the table on page 125 shows that New South Wales is the only Australian State whose trade exceeds that of New Zealand.

The following is the order of Australian ports arranged according to the tonnage of shipping (over-sea and coastwise) entered during 1922-23:—

*The dried kernel of the coco-nut, used in the manufacture of soap and candles.

(1) Sydney, £8·8m.; (2) Melbourne, £7m.; (3) Newcastle, £4·6m.; (4) Adelaide, £4m.; (5) Brisbane, £3m.; (6) Fremantle, £2·6m.; (7) Townsville, £1m.; (8) Mackay, £·78m.; (9) Albany, £·72m.; (10) Pirie, £·6m.; (11) Hobart, £·58m.; (12) Cairns, £·57m.; (13) Geelong, £·55m.; (14) Rockhampton, £·49m.; (15) Bowen, £·48m.; (16) Burnie, £·46m.; (17) Launceston, £·38m., (18) Devonport, £·35m.; (19) Thursday Island, £·3m.; (20) Bunbury, £·3m.; (21) Wallaroo, £·23m.

In 1922-23 about 77% of the shipping entering Australian ports was British.

Shipping.—In order to be not entirely dependent upon the services provided by the numerous shipping companies that have Australian connections, the Commonwealth Government is building up a merchant service fleet partly by direct purchase and partly by construction. It is called the Commonwealth Government Line. The local ship-building is carried out at Williamstown, Walsh Island, Cockatoo Island, and other dockyards, while other ships are ordered abroad, steel vessels in Great Britain, and wooden vessels at Seattle (U.S.A.). The Board of Directors appointed in 1923 has disposed of a number of vessels.

4.—DISTRIBUTION OF TOWNS AND PRODUCTS

NEW SOUTH WALES

Products.—Sheep, cattle, horses, wool, tallow, hides, butter, cheese, condensed milk, frozen meat, bacon and hams, fish; sugar cane, tobacco, maize, fruits (oranges, lemons, grapes, and N. European fruits), timber, potatoes, wheat, oats; gold, coal, silver, lead, copper, tin, zinc.

Manufactures.—Woollens, leather, boots and shoes, soap and candles, flour, wine, tobacco, iron, agricultural implements, and machinery.

Population—Estimated Dec. 31st, 1923, 2,209,000.

Seaports

Sydney (with suburbs, 981,000), is the oldest and largest town and port of the Commonwealth. It is the chief distributing centre of New South Wales, for it

receives and exports most of the products of the State, and imports and distributes most of the goods that have to be obtained from abroad. Its total annual trade is about £94m. Lines of steamers connect it with New Zealand and the Pacific Islands, with America, Asia, and Europe. The harbour is renowned for its size, convenience, and beauty. The only other important port is **Newcastle** (71,000), which has an artificial harbour on the estuary of the Hunter River. It is the greatest coal port of Australia, for it sends coal not only to other States of the Commonwealth but to New Zealand, the Pacific Islands, and South American ports. It also has important iron-smelting works belonging to the Broken Hill Company, which smelts the ore brought from Iron Knob in South Australia.

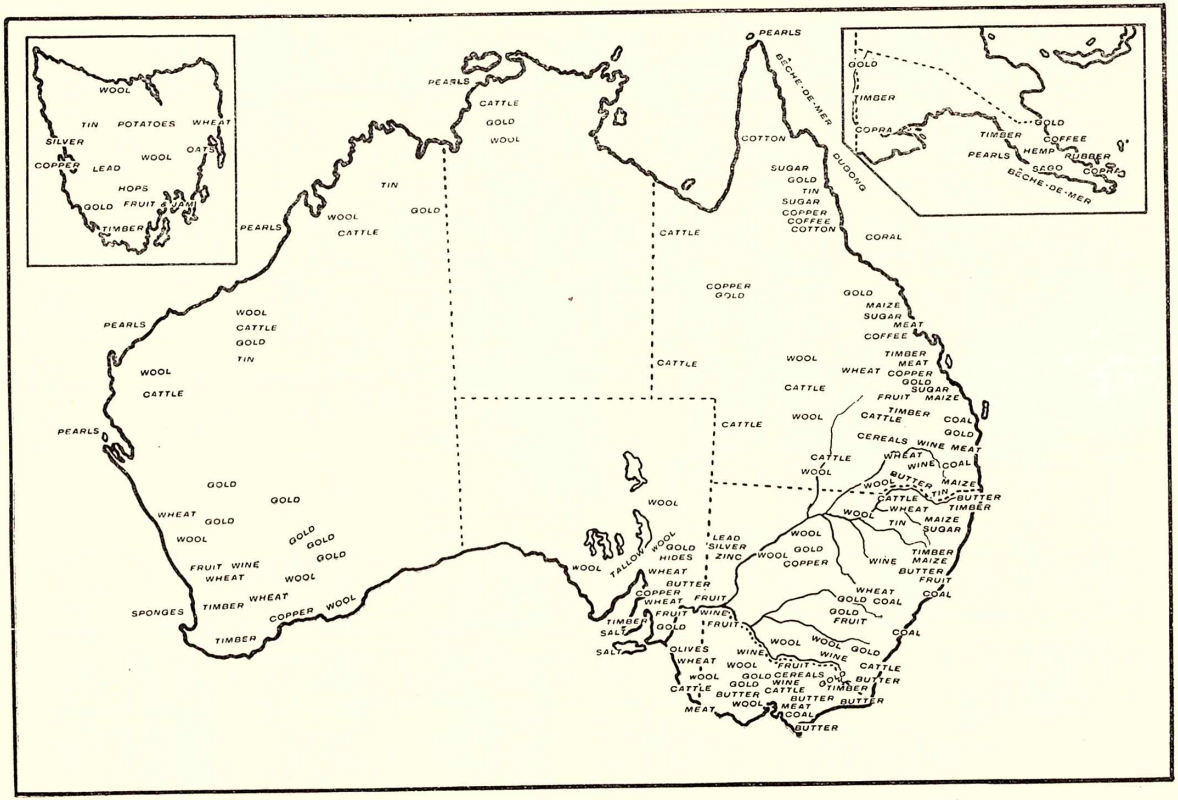
Wollongong, south of Sydney, exports coal and dairy produce. At **Port Kembla,** south of Wollongong, an iron and steel works is established.

Inland Towns

The towns may be grouped according to the leading industries, which are: sheep-farming, agricultural farming, dairying, fruit-growing, and mining. The chief sheep-farming centres are **Bourke** (1,600), on the Darling (with rail to Sydney), **Deniliquin** (2,800), on the Murray and in the Riverina (with rail to Melbourne), **Forbes** (5,000), on the Lachlan, **Hay** (2,400), and **Wagga Wagga** (15,000), on the Murrumbidgee, the capital of the Riverina, a wheat, fruit, vine, and sheep region.

The best wheat-growing area* lies along the western slopes of the main range from about Lat. 31°, south to the Murray. The farming centres are:— **Goulburn** (14,700), on the Melbourne-Sydney railway, **Bathurst** (14,000), on the Macquarie River, in the heart of the wheat-growing lands west of the Blue Mountains, **Dubbo** (6,500), also on the Macquarie, where sheep land has been largely turned into wheat land. **Orange** (6,000), west of Bathurst, in a rich

*See map, p. 190.



Products of the Commonwealth.

farming and fruit-growing district, has grain mills, and **Albury** (8,000), on the Murray, is a growing trading centre and railway town famous for its vineyards, wines, and wheat. In the north-east of the State are **Maitland** (13,000), on the Hunter River, in a rich district which produces maize, dairy produce, and fruit, **Tamworth** (9,000), and **Armidale** (6,500), both important farming and dairying towns on the Northern Tableland. In the New England district about **Grafton** (5,600) sugar is cultivated in plantations.

The dairying industry is best established on the eastern slopes of the main divide, where an abundant rainfall produces a plentiful growth of pasture. The principal centres are **Lismore** (8,200), also in a maize and timber district, in the north-east, **Singleton** (4,600), and **Maitland** on the Hunter River, and **Eden** on Twofold Bay in the far south-east, as well as Tamworth and Armidale named above.

Fruit-growing is a special industry at **Parramatta** (13,000), famed for its orange groves and orchards. **Orange** has already been mentioned as a fruit-growing centre, and **Albury**, in the Riverina, as noted for its vine-growing.

The chief minerals produced are coal, lead and silver, zinc, iron, tin, and gold.

The chief coal mines are at **Newcastle**, on the Hunter, **Bulli** (5,500) (Illawarra), south of Sydney, **Lithgow** (15,000), 100 miles west of Sydney, and **West Maitland** (including Kurri Kurri, Pelawmain, Aberdare, and Hebburn), 123 miles by rail north of Sydney. Sydney Harbour Colliery is remarkable for the depth of its workings. Lithgow has large potteries, the Commonwealth small arms factory, and important iron and steel works. Gold, the output of which is declining, is mined at **Cobar** (4,600), 120 miles south of Bourke, **Bathurst**, and **Mudgee** (5,000), 190 miles north-west of Sydney. Tin is mined in the New England Range, *e.g.*, at **Tenterfield** (2,400). **Broken Hill** (32,000), near the South Australian border, is one of the chief silver-

mining towns in the world. Lead and zinc are also obtained. It is connected by rail with its seaport, Port Pirie, on Spencer Gulf (S.A.), and with Adelaide. The railway continues eastward to Menindie (73 miles), and will ultimately connect with the line from Sydney, which now reaches Trida. Copper is obtained at **Cobar.**

VICTORIA

Products.—Sheep, cattle, horses, wool, tallow, hides, butter, cheese, condensed milk, frozen meat, bacon, fish; sugar-beet, tobacco, maize, fruits (apple, plum, peach, apricot, cherry, pear), dried currants and raisins, timber, potatoes, onions, wheat, oats, barley, grass seed, wattle bark; gold, coal, salt.

Manufacturers.—Woollens, leather, boots and shoes, soap and candles, flour, beet sugar, wine, tobacco, agricultural implements and machinery.

Population.—Estimated 31st Dec., 1923, 1,625,000.

Seaports

Melbourne (with suburbs 853,000), on Port Phillip, at the mouth of the Yarra River, is the second town and port of Australia and the capital of the State of Victoria. It was first chosen (in 1835) as the site for a city because of the good sheep country around it, and the abundant supply of fresh water it possessed in the river Yarra. Besides these advantages it has an excellent harbour, and a central position on the coastal plain of Victoria with easy approach from all directions. Most of the shipping is carried on at Port Melbourne and Williamstown, some $2\frac{1}{2}$ miles from the centre of the city. The suburban electrical railway system of Melbourne is one of the most efficient in the world. The second port of Victoria is **Geelong** (37,000), which exports the wool raised on the plains to the south-west. It has manufactures of woollens, motor bodies, leather, paper, and salt. **Portland**, on the south coast, is an old sealing town, and exports agricultural and pastoral produce. **Warrnambool** (7,900), exports wool, dairy and farm produce raised on the rich lands that surround it. It is also becoming a manufacturing town.

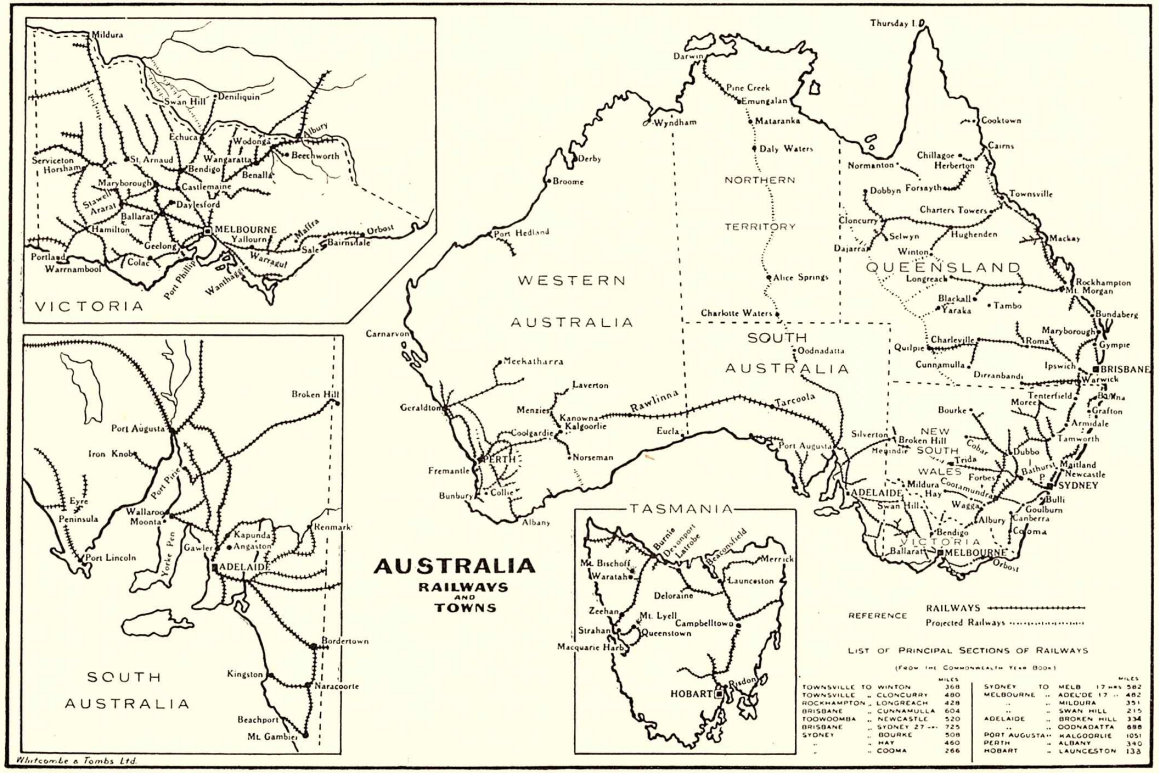
Inland Towns

Victoria is the second gold-mining State of the Commonwealth. **Ballarat** (45,000), formerly the

leading gold-mining town, now has a smaller output than Bendigo, Beechworth, Castlemaine, and Maryborough. A rich agricultural area (wheat, oats, barley, and potatoes) surrounds it. It has woollen mills and other factories. **Bendigo** (34,000), the leading gold-mining town, is also an important railway, wine-producing and farming centre. **Castlemaine** (7,800), on the railway from Melbourne to Bendigo, once a great mining town, is now the centre of a fruit-growing region, and manufactures machinery, leather, and woollen goods. Other old mining towns and important railway centres are **Maryborough** (5,000) (gold and farm produce), **Beechworth** (3,450) (in the north-east), **Stawell** (5,000) (in the west), **Ararat** (5,500) (grape vines and timber), and **Daylesford** (3,900) (farming and tourist resort).

As we have seen, many of the mining centres are also farming centres and railway towns. Indeed, mining towns die out when once the gold is exhausted, unless they are surrounded by farming land. There is also a number of towns depending upon agriculture. **Hamilton** (5,100), lies in a sheep and grain district to the south-west. **Echuca** (5,500), north of Melbourne, at the limit of steam navigation on the Murray River, is in a wheat, wool, and timber area. **Swan Hill** and **Mildura** (5,500) are two other Murray ports, the latter being a successful irrigation settlement for fruit-growing. **Wangaratta** (4,050) and **Benalla** (3,300) first grew up where the Sydney-Melbourne road crossed the Ovens and Broken River respectively. Now they are inter-state railway stations in rich farming and fruit-growing districts. **Warragul** is a dairying centre on the Gippsland railway. **Camperdown** (3,750), and **Colac** (4,250), are also railway and trading centres for dairying and sheep-farming districts south of Lake Corangamite. In the east **Sale** (3,880), and **Bairnsdale** (4,000) are important agricultural towns in the Gippsland district.

Victoria is not well endowed with coal, except in Gippsland. The State has mines at **Wonthaggi** (5,600), and **Morwell** (brown).



Railways of the Commonwealth.

Victoria is not yet a great manufacturing State, though woollen manufactures are firmly established at **Williamstown, Geelong, Warrnambool, Ballarat, Castlemaine, Collingwood, Footscray, Stawell, Daylesford, Wangaratta,** and **Sale.**

QUEENSLAND

Products.—Sheep, cattle, horses, wool, tallow, hides and skins, butter, cheese, condensed milk, frozen meat, bacon, fish, pearls, pearlshell, bêche-de-mer (trepang); cotton, coffee, sugar cane, tobacco, maize, fruits (banana, orange, pineapple, mango, guava, melon, apple, peach, plum), timber, English and sweet potatoes, wheat, grass seed; gold, coal, silver, lead, copper, tin.

Manufactures.—Soap and candles, wine, agricultural implements and machinery.

Population.—Estimated 31st Dec., 1923, 811,000.

Seaports

The east coast of Queensland is protected by the Great Barrier Reef, and also contains quite a number of bays and river mouths, upon which seaports have grown up. Several of the rivers that traverse the eastern coastal plain are navigable for a considerable distance. From the ports, railways run out to the various gold, copper, tin, and coal mines, for which the State is famous. **Brisbane** (236,000) is situated about 20 miles from the mouth of the Brisbane River. In the rainy season parts of the city are sometimes flooded by the river. Dredges keep the channel clear for ocean steamers. The produce of southern Queensland is brought by rail and coastal steamer to Brisbane. **Maryborough** (13,000), 180 miles north of Brisbane, is the outlet of the Gympie goldfield, and for a rich farming district. **Bundaberg** (10,000), on the Burnett River, is the outlet of a rich sugar-growing district. A large sugar-refinery is established here. **Rockhampton** (24,000), on the Fitzroy River, is the port for the sheep and cattle stations of central Queensland, as well as for rich copper and gold mines in the neighbourhood. **Mackay** (5,900), at the mouth of the Pioneer River, exports sugar. **Townsville** (15,800), on Cleveland Bay, is the chief town of Northern

Queensland, and its western railway brings copper from Cloncurry, gold from Charters Towers, and farm products from the surrounding country. **Cairns** (6,500), is the port of a sugar, maize, and fruit district and the copper mines of **Chillagoe. Cooktown,** on the Endeavour River, is also the outlet of a sugar-growing, fruit, gold, and tin mining region. It is visited by several lines of steamers, and is a port for bêche-de-mer and pearl-fishing. **Thursday Island,** off Cape York, is a port of call for vessels trading between Australia and eastern Asia, and is the headquarters of the Queensland pearl fisheries.

Sugar is grown on hot, moist, fertile coastal lands near Maryborough, Bundaberg, Mackay, Cairns, and Cooktown.

Inland Towns.

Mining Towns.—Coal is widely deposited at **Ipswich** (18,500), near **Maryborough, Chillagoe, Callide,** and **Blair Athol.** Gold at **Gympie** (15,000) near Maryborough, **Mt. Morgan** (12,000), west of Rockhampton, and **Charters Towers** (17,000), 80 miles inland from Townsville. Copper at **Cloncurry** and **Mt. Morgan,** west of Townsville, and **Chillagoe,** west of Cairns. Tin at **Herberton** in the north and **Stanthorpe** in the south.

Inland pastoral centres are **Winton, Hughenden,** and **Dajarra,** connected by rail with Townsville; **Longreach,** connected by rail (400 miles) with Rockhampton; **Charleville, Quilpie, Cunnamulla,** termini of the Western Railway from Brisbane, and **Thargomindah.**

A large plateau in the south, known as the Darling Downs, contains land of great fertility. Sheep farming, dairying, and the cultivation of wheat, fruit, and potatoes are all flourishing industries. The chief towns are **Toowoomba** (20,000), **Warwick** (6,000), on the Condamine, and **Roma,** on the railway to Brisbane.

SOUTH AUSTRALIA

Products.—Sheep, cattle, horses, wool, tallow, hides, butter, cheese; fruits (orange, lemon, almond, olive, grapes, and N. European fruits), dried currants and raisins, timber, wheat, oats; copper, iron ore, salt, gold.

Manufactures.—Soap and candles, flour, wine, olive oil, agricultural implements and machinery.

Population.—Estimated 31st Dec., 1923, 525,000.

Seaports

The chief port is **Port Adelaide** (31,000), on St. Vincent's Gulf, 7½ miles from Adelaide, the capital of the State, with which it is connected by rail. **Port Pirie** (12,000), on Spencer Gulf, is the port for the Broken Hill mines. It imports the coal and timber they require, and has large works for smelting the ores brought from them by rail. It is also the outlet for the wool and wheat produced in the neighbourhood, and is the second port of the State. **Port Augusta** (1,500), at the head of Spencer Gulf exports copper ore, farm and station produce. **Wallaroo** (3,500), on Spencer Gulf, is a copper-mining and smelting town, with exports of copper, lead, and wheat. It is the third port of the State. **Port Lincoln** is the outlet of the wheat land of the Eyre Peninsula.

Inland Towns

Adelaide (with suburbs 279,000), situated on the Adelaide coastal plain, 7½ miles from its seaport (Port Adelaide) on the Gulf of St. Vincent, is the capital of the State, and a well laid out city. It is the chief railway and distributing centre of the State. Favourite seaside resorts are Henley Beach, Glenelg, and Brighton.

The chief agricultural towns are **Gawler**, north of Adelaide, **Kapunda** and **Burra**, further north, **Murray Bridge**, a river and railway town east of Adelaide, and **Bordertown**, on the railway line close to the Victorian border. **Mt. Gambier**, in the south-east, is in a rich farming and dairying district.

Fruit-growing is an important industry at **Renmark** (3,000), an irrigation settlement of 5,000 acres on the Murray, and at **Angaston** (3,500), about 50 miles north-east of Adelaide. Large areas are devoted to vine-growing, making this State the vineyard of the Commonwealth, and the greatest exporter of wine.

When the Murray locking scheme is completed the agricultural and fruit-yielding capacity of the Murray Valley will be vastly increased.

Important railway towns are: **Petersburg**, at the junction of the main north line and the Broken Hill line; **Quorn**, the junction for Port Augusta, whence the Trans-Australian railway runs to Kalgoorlie, in Western Australia; and **Oodnadatta** (688 miles from Adelaide), the terminus of the northern line and starting point of camel teams used in Central Australia.

Mining is of less importance than in other States of Australia. Excellent iron ore is mined at Iron Knob, south-west of Port Augusta, and exported *viâ* False Bay to Newcastle. Very little gold is found, and no really good coal. Large quantities of Newcastle coal are imported. Copper is the chief mineral. The principal copper mines are at **Moonta** (1,800), **Wallaroo**, and **Kadina** (2,500), north of Yorke Peninsula. **Burra** and **Kapunda** formerly possessed rich copper mines, and are now important farming centres.

WESTERN AUSTRALIA

Products.—Sheep, cattle, horses, wool, tallow, hides, frozen meat, butter, cheese, pearls, pearl shell; fruit, wine, timber (jarrah, marri, karri, sandalwood), wheat, flour, hay; gold, coal, copper, tin.

Population.—Estimated 31st Dec., 1923, 354,000.

Seaports.

Fremantle (25,000), to the south of the Swan River mouth, is the chief port. It has factories and smelting works, and is the first and last port of call for European mail steamers. **Albany** (4,000), on King George's Sound, has railway communication with

Perth. Timber is an important export. **Geraldton** (3,600), about 250 miles to the north of Fremantle, exports wool and wheat and other farm produce. It is the chief railway centre north of Perth. A branch line connects with **Cue**, the trading centre for the Murchison goldfields. **Broome**, on Roebuck Bay, in the north-west, is a pearling centre and cattle port, inhabited chiefly by natives of Asia. Shark's Bay is an important pearl fishing ground. **Bunbury** (4,500), to the south of Fremantle, exports timber, fruit, coal, and tin.

The capital of the State is **Perth** (172,000), about 12 miles from the mouth of the Swan River. It is connected by rail with all productive parts of the south-west of the State, viz., the gold fields of the east and north, the sheep, cattle and mixed farming region of the west, the inland wheat belt stretching south-east from Geraldton to the Bight, and the timber region of the south-west.

Western Australia is very rich in minerals. The gold mines are the most important. The yearly output of gold is now many times that of Victoria. The principal mines are at or near **Kalgoorlie** (32,000), **Coolgardie** (4,000), **Mount Margaret, Murchison** (near Cue), **Southern Cross** (Yilgarn), **Kanowna, Menzies** and **Dundas** (near Norseman). Gold is also found in the north in the Pilbara and Kimberley districts. All mining centres have railway communication with the coast. The inter-State railway from Perth passes through Southern Cross, Coolgardie, and Kalgoorlie. This region is so dry that fresh water is carried by large steel pipes from the Helena River, near Perth, a distance of nearly 350 miles. Coal is mined at **Collie**, east of Bunbury.

The gold-producing region at Kalgoorlie is called "The Golden Mile."

NORTHERN TERRITORY

Products.—Sheep, cattle, pearls, pearlshell, bêche-de-mer (trepang), sugar-cane, rice, coffee, rubber, cotton, tropical fruits; tin, copper, gold.

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Population.—3,555 Europeans and Asiatics, and probably 20,000 aborigines.

The Northern Territory, formerly a part of South Australia, has since Jan. 1st, 1911, been under the control of the Federal Government. It is a large area possessing great natural resources of soil, pasture, rainfall, and minerals. These, however, are very little developed; for the tropical climate discourages settlement by Europeans, and the Government is opposed to settlement by any alien race. The industries at present carried on are cattle-rearing, mining and pearling, Attempts at agriculture have proved the suitability of the country for the production of the tropical plants named above.

The Commonwealth Government has in hand an ambitious project for the development of the whole of Australia north of the 20th parallel between Broome and Normanton, and its conversion in ten years' time into a region maintaining from 10 to 20m. sheep.

Darwin (formerly Palmerston), the chief town, with a population of only a few hundred, mostly Asiatics, overlooks the very fine harbour of Port Darwin. The one railway of the Territory runs south from Darwin through Pine Creek to Emungalan on the Katherine River, nearly 200 miles distant. This is the beginning of a transcontinental railway, following the route of the overland telegraph, that will be necessary before any marked progress will be made. Cables connect Darwin with Java and so with Asia and Europe. The port has regular steam communication with Australian States and with the East.

The railway referred to is already projected to **Daly Waters**. Another station on the overland telegraph is **Alice Springs**, situated almost on the Tropic of Capricorn—in the very heart of the continent, and on the south side of the Macdonnell Range (at an elevation of 1926 ft). Its situation makes it an interesting meteorological station.

TASMANIA

Products.—Sheep, cattle, wool, tallow, hides, butter, cheese; fruits (chiefly apples, but also pears and European stone, pip, and berry fruits), jam, timber (Huon pine, blue-gum, Van Diemen's Land palings), hops, potatoes, wheat, grass seed; gold, silver, lead, copper, tin.

Population.—Estimated 31st Dec., 1923, 219,000.

Seaports.

Hobart (55,000), on the Derwent estuary, is the chief port, and exports fruit, jam, wool, and timber.

There is at present no regular direct steamer communication between New Zealand and Tasmania, most of the trade taking place *viâ* Melbourne.

Hobart is supplied with electric light and power by a hydro-electric plant (the largest in the Commonwealth), situated 63 miles distant at Great Lake. It has zinc refining and carbide works as well as a cocoa and chocolate factory.

Large smelting works have been established at **Risdon**, near Hobart.

New Norfolk, at the head of the navigation of the Derwent, is a fruit-growing centre. **Launceston** (25,000), on the Tamar River, is the chief northern port. It has railway communication with all the chief mining and industrial centres of the island as well as steam communication with Melbourne (tri-weekly) and Sydney. It manufactures woollens, and, like Hobart, is supplied with electricity from Great Lake. **Devonport** (4,700), **Ulverstone** and **Stanley** are thriving ports on the north coast (Bass Strait), engaged in the export of farm produce. **Burnie** (3,600), also on the north coast, exports dairy and farm produce to Melbourne (bi-weekly service), and is the outlet of the Mt. Bischoff tin-mining district, with which it is connected by rail. **Strahan**, on Macquarie Harbour in the west, is connected by rail with the silver and tin-mining centres of **Zeehan** and **Dundas**, and exports the ore obtained therefrom. Both **Strahan** and **Zeehan** have large smelting works.

Inland Towns.

The chief mining centres are **Zeehan** (6,000) (silver, lead, and tin); **Queenstown** (5,000), and **Gormanston** (3,000) (copper, gold, silver), near Mt. Lyell in the west; **Waratah** (tin and silver), near Mt. Bischoff in the north-west; and **Beaconsfield** (3,100) (gold), in the north. Zeehan smelts the silver and lead of the neighbouring mines, Queenstown the ores from the Mt. Lyell mines, and Launceston the ores from Mt. Bischoff. Coal is mined at **Fingal**, on the South Esk, and at **Mt. Nicholas**, near St. Mary's, mostly for local use.

Among the inland agricultural towns the more important are **Deloraine**, 45 miles by rail west of Launceston, noted for farm produce and fruit, and **Campbelltown**, a prominent merino wool centre and railway town.

PAPUA (OR BRITISH NEW GUINEA)

(A Territory of the Commonwealth of Australia.)

The island of New Guinea, which is separated from the north of Queensland by Torres Strait, is in the hands of the Netherlands and England. The British territory lies in the south-east, and its government was undertaken by the Commonwealth in 1906. Of its half-million population only some 1086 are Europeans. There are extensive plantations of coco-nuts, rubber, and sisal hemp. The forests contain valuable timbers. Gold and copper mining are important industries. The chief exports are copra, gold, bêche de mer, sisal hemp, pearlshell, pearls, copper, timber, rubber. The imports include foodstuffs, drapery and clothing, hardware, and tobacco. The trade is chiefly with Queensland and New South Wales. The seat of government and foreign trade is **Port Moresby**, with a population of about 2,000.

THE TERRITORY OF NEW GUINEA.

(Administered by the Commonwealth under mandate from the League of Nations.)

Of the German territories in the Western Pacific that were seized by an Australian Force on Sept. 12th, 1914, those whose administration has been assigned to Australia, viz., all south of the Equator, are now included in the title New Guinea. They are (1) North-East New Guinea (Kaiser Wilhelm's Land), (2) Bismarck Archipelago, (3) part of the Solomon Islands.

(1) North-East New Guinea (or Kaiser Wilhelm's Land) is the north-eastern portion of south-east New Guinea and the adjacent islands. Estimates of the native population vary from ·1m. to ·5m. The principal station on the mainland is Friedrich Wilhelm's Haven, now called **Madang**, in Astrolabe Bay. Products are coco-nuts, rubber, cocoa, and tropical fruits.

(2) Bismarck Archipelago includes New Britain, New Ireland, and the Admiralty Islands. The capital of New Britain is **Rabaul**, on Simpson Harbour, where there is good anchorage and a fine jetty. Coco-nuts are largely grown. The chief town on New Ireland is **Kavieng**. The main industry is coco-nut growing. In the Admiralty Group this industry is supplemented by pearl and other shell fisheries.

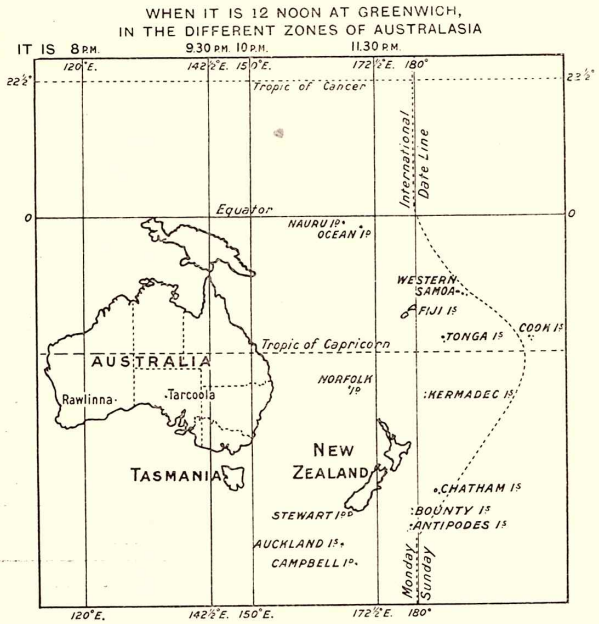
(3) The Solomon Islands (Bougainville and Buka) are volcanic, and as yet commercially unimportant. The natives grow bananas, coco-nuts, taro, and sweet potatoes.

Nauru.—As already mentioned, this islet, situated just south of the Equator, having been assigned to the British Empire as mandatory, is under the joint control of Great Britain, Australia and New Zealand. (See page 132.) The phosphatic rock imported from Nauru and Ocean Island is converted into superphosphates at **Yarraville**, near Melbourne.

APPENDIX—I.

STANDARD TIME.

The time of day at every place in the earth is fixed by its position with regard to the sun. The earth turns a complete circle, *i.e.*, 360° in every 24 hours. Hence it turns through 1° in 24 hours ÷ 360 = $\frac{24 \times 60}{360}$ = 4 minutes. Taking the Greenwich



Standard Time in Australasia.

or Zero meridian as a starting point, for every degree a place is east of that line its time is 4 minutes in advance (or fast) of Greenwich time, and similarly for every degree a place is west of that line its time is 4 minutes behind (or slow on) Greenwich time. But most countries extend over many degrees of longitude, and only those towns that are on the same meridian rightly have the same local time. It is easy to see how inconvenient it would be if each place set its clocks to

the time of its own meridian. Endless confusion would result with regard to railway and mail time-tables. Different countries have, therefore, come to an agreement by which the globe is divided into strips or zones from north to south, and all places within each zone set their clocks to the same time. The zones are usually 15° wide, and the time of the central meridian is chosen as the time of the whole zone. Time so reckoned is called **Standard** or **Zone Time.** Thus Greenwich time is kept by Great Britain, France, Belgium, Holland, Spain, and Portugal, etc., because all these countries lie almost entirely in a zone of 15°, of which the Greenwich meridian is the centre.

The dividing line between east and west longitude is the 180th meridian, and Australasia lies far east of Greenwich, so that her time is many hours in advance of Greenwich time. As the different states of Australasia extend over more than 60° of longitude, she is divided into four distinct time zones. These are not exactly of 15° each, for the boundaries of the zones are made wide enough to suit the convenience of the different States. The four zones are: (1) New Zealand, (2) Eastern Australia (Victoria, New South Wales, Queensland, and Tasmania), (3) South Australia, (4) Western Australia. In each case the most convenient meridian is chosen to give the time to the whole zone. They are (1) 172½° E., (2) 150° E., (3) 142½° E., and (4) 120° E., so that the Standard Time for New Zealand is 11½ hours fast of Greenwich time; that of Eastern Australian States 10 hours fast; South Australia 9½ hours fast; and Western Australia 8 hours fast. In New Zealand the practice is to telegraph the time from Wellington at 9 o'clock every morning to every railway station and post office throughout the Dominion.

The meridians shown in the map are those chosen to give the time to the different zones.

The following table is a re-statement of the above facts:—

Zone.	Central Meridian	Time fast on Greenwich time.
1. New Zealand	172½°	11½ hrs.
2. Eastern Australia (Victoria, N.S.W., Queensland and Tasmania)..	150°	10 hrs.
3. South Australia ..	142½°	9½ hrs.
4. Western Australia ..	120°	8 hrs.

Since the Trans-Australian railway has been open an arrangement has been come to by which the difference in time between (3) and (4) above (viz., 1½ hrs.) is divided into two changes of 45 minutes each. Going east from Kalgoorlie time is put forward 45 minutes at **Rawlinna** (235 miles out), and again at **Tarcoola** (794 miles out). Thenceforward South Australian time is kept until the eastern zone is reached.

Standard time is, of course, subject to annual alteration by those countries (*e.g.*, United Kingdom) which adopt daylight saving between certain dates in summer. Clocks are put forward a specified number of minutes on a specified date, and normal time resumed at the end of a stated period. In New Zealand no such change is made in summer. Summer time was adopted in Australia, but was shortly afterwards repealed.

APPENDIX—II.

MAPPING.

The object of the sketch maps in squares on the opposite page is to help the student to draw fair outline maps in a short time. Inch squares should be rapidly marked off with lead pencil and ruler, and the outline sketched in by noting the various points of intersection of the coast line with the sides of the squares. The same method may be practised with advantage in learning to sketch any map.

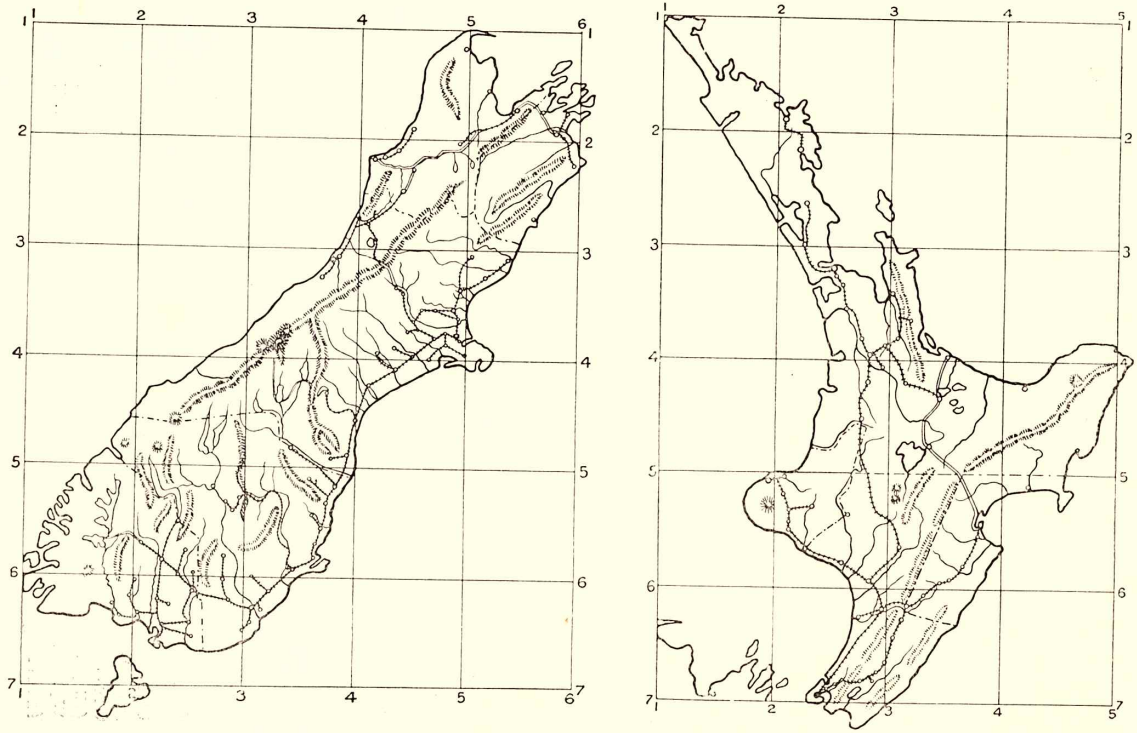
APPENDIX—III.

LOCATION OF INDUSTRIES IN NEW ZEALAND.

Meat-freezing and Preserving (48 in 1922-23). Moerewa, Southdown, Horotiu, Westfield (2), Whakatane, Westshore, Pakipaki, Tomoana, Whakatu, Wairoa, Waipaoa, Kaiti, Tokomaru Bay, Hicks Bay, Smart Road, Waitara, Eltham, Patea, Castlecliff, Imlay, Winiata, Aorangi, Longburn, Waingawa, Petone, Ngahauranga (2), Kakariki, Picton, Stoke, Belfast, Fairfield, Pareora, Islington, Smithfield, Kaiapoi, Belfast, Pukeuri, Burnside, Finegand, Ocean Beach, Mataura, Makarewa, Bluff.

Dairy Factories (526 in 1923).—Hamilton, Cambridge, Te Aroha, Te Puke (Bay of Plenty), Gisborne, Stratford, Mangatoki, Inglewood, Eltham, Hawera, Wanganui, Palmerston North, Woodville, Carterton, Featherston, Addington (Christchurch), Akaroa, Ashburton, Oamaru, Edendale, Mataura, Wyndham.

Farming Centres—Otahuhu, Hamilton, Te Awamutu, Cambridge, Whakatane, Opotiki, Gisborne, Hastings, Waipukurau, Woodville, Hawera, Palmerston North, Wanganui, Hutt, Greytown, Carterton, Masterton, Blenheim, Kaikoura, McKenzie (Cheviot), Culverden, Rangiora, Christchurch, Ashburton, Waimate, Geraldine, Temuka, Mosgiel, Gore, Milton, Clinton, Invercargill.



The islands of New Zealand in squares as aids to mapping. *By permission of W. A. Kennedy*

Flax-milling—Kawa Kawa, Dargaville, Patetonga, Morrinsville, Te Puke, Te Aroha, Whakatane, Papamoa, Tuakau, Waverley, Wairoa, Takapau, Shannon, Koputaroa, Tokomaru, Linton, Foxton, Levin, Waikanae, Featherston, Martin-Balclutha, Kaitangata, Beaumont, Romahapa, Glenledi, Winton, Wyndham, Riverton, Pukemaori, Invercargill.

Flour-milling (48 mills in 1925)—Auckland (3), Sentry Hill (near New Plymouth)), Wanganui, Marton, Feilding, Palmerston North, Carterton, Richmond (Nelson), Blenheim (2), Woodend, Cust, Southbrook, Kaiapoi, Christchurch (4), Addington, Templeton, Brookside, Southbridge, Ashburton (2), Winchester, Timaru (4), Waimate, Oamaru (3), Maheno, Glenpark, Dunedin (6), Luggate, Arrowtown, Lawrence, Waiwera South, Invercargill. Of these, one at Christchurch grinds oatmeal only, 39 grind flour, bran, and pollard, and 8 others grind oatmeal as well. Only 9 out of 48 are in the North Island.

Saw-milling (90 bush-mills in 1924)—Rawene, Broadwood, Dargaville, Okaihau, Runaruna, Kopu, Walton, Waiuku, Pirongia, Kawhia, Raurimu, Raglan, Taumarunui, Katikati, Te Whetu (Putararu), Pongakawa, Mamaku, Whakamarama, Hakapapa, Mananui, Karioi, Pohukura, Motuhora, Mangahao, Matiere, Tadmor, Upper Takaka, Little Wanganui, Karamea, Mokihinui, Charleston, Canvastown, Onekaka, Stanley Brook, Ross, Gladstone, Inchbonnie, Kanieri Forks, Rankleburn, Makarora, Waihola, Kahuika, Catlins, Romahapa, Tawanui, Puketiro, Owaka, Tahatika, Houipapa, Spar Bush, Wyndham, Pukemaori, Tokonui, Otautau, Paradise, Stewart Island.

Woollen Factories (12 in 1924)—Onehunga, Wanganui, Napier, Petone, Kaiapoi, Ashburton, Timaru, Oamaru, Mosgiel, Roslyn, Milton, Rosedale.

Gold-mining—Coromandel, Waihi, Karangahake, Paeroa, Reefton, Ross, Lawrence, Roxburgh, Alexandra, Clyde, Cromwell, Arrowtown, Shotover, Naseby, Barewood, Macrae's.

Coal-mining.—Kamo, Hikurangi, Mokau, Huntly, Taupiri, Pukemiro, Denniston, Millerton, Westport, Reefton, Brunnerton, Blackball, Liverpool, Homebush, Mount Somers, Kaitangata, Green Island, Burnside, Shag Point, Mataura, Nightcaps.

Boot and Shoe Factories (80 in 1922-3)—Auckland, Christchurch, Oamaru, Dunedin.

Soap and Candle Works (18 in 1922-3)—Auckland, Christchurch, Green Island, Invercargill.

APPENDIX—IV.

MAIN HIGHWAYS.

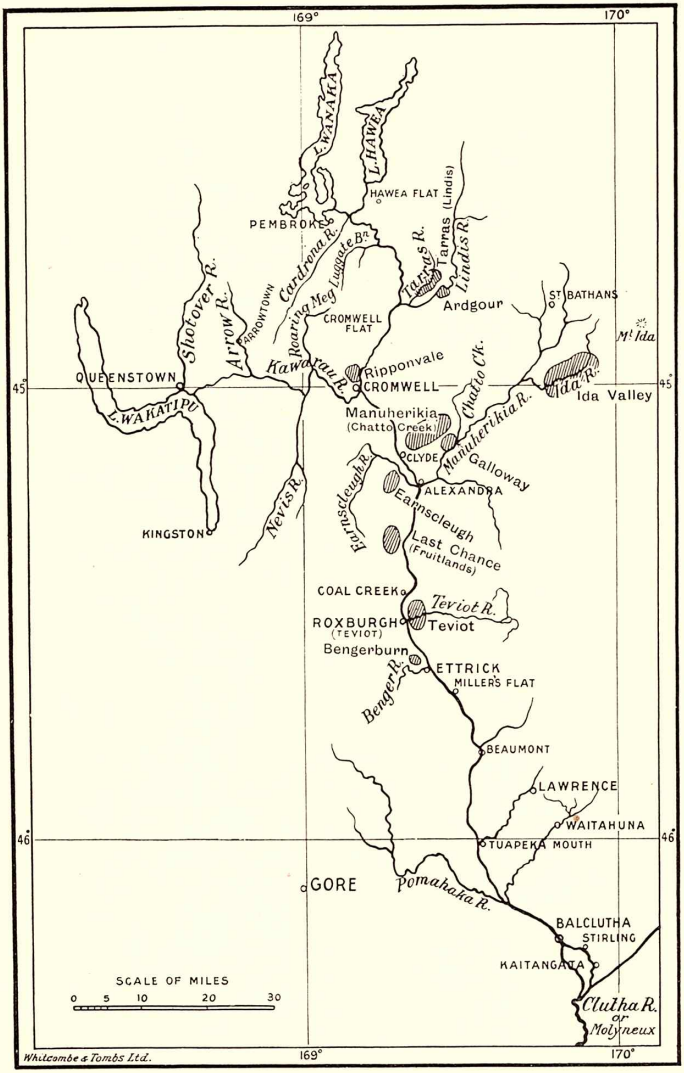
There are 147 roads in New Zealand classed as main highways, 80 in the North Island and 67 in the South Island. Some of the longest are as follow:—

NORTH ISLAND.	miles
Waipapakauri to Wellingon, *viâ* Taranaki	680
Omapere—Maungaturoto	99
Whangarei-Dargaville	37
Wainui-Auckland, *viâ* Helensville	48
Pokeno-Wellington, *viâ* Gisborne and Wairarapa	651
Hamilton-Rotorua-Petane	214
Auckland-Wellington Junction to Bulls *viâ* Taumarunui	191
Rotorua-Whakatane	53
Hicks Bay-Gisborne	123
Dannevirke-Waipukurau *viâ* Porangahau	79
Lepperton Junction-Hawera *viâ* Opunake	73
Stratford-Tangarakau River	63
Wanganui-Horopito	67
Greatford—Woodville *viâ* Feilding and Ashurst	34
Weber-Masterton *viâ* Alfredton	74
SOUTH ISLAND.	
Picton-Bluff	627
Blenheim-Waiho, *viâ* Nelson	385
Richmond-Pakawau	90
Westport-Karamea	62
Upper Riccarton-Kumara	133
Kaikoura-Waipara	92
Christchurch-Akaroa	53
Washdyke-Tekapo	62
Pukeuri-Kurow	35
Palmerston-Queenstown *viâ* Beck's	154
Mosgiel-Middlemarch	43
Clarksville-Springvale	91
Kennington-Waikawa	56
Gore-The Key	73
Argyle-Tuatapere	42
Invercargill-Riverton	23

APPENDIX—V.

IRRIGATION AREAS IN CENTRAL OTAGO.

	Area to be Irrigated.
Private Scheme.	
Ripponvale	(?)2,000 acres
Government Schemes.	
Ida Valley	18,500 acres
Galloway	2,250 „
Manuherikia (Chatto Creek)	11,000 „
Ardgour	2,000 „
Earnscleugh	2,400 „
Last Chance (Fruitlands)	3,000 acres
Tarras (Lindis)	7,000 „
Bengerburn	1,000 „
Teviot	3,300 „



By courtesy of Engineer Public Works, Otago

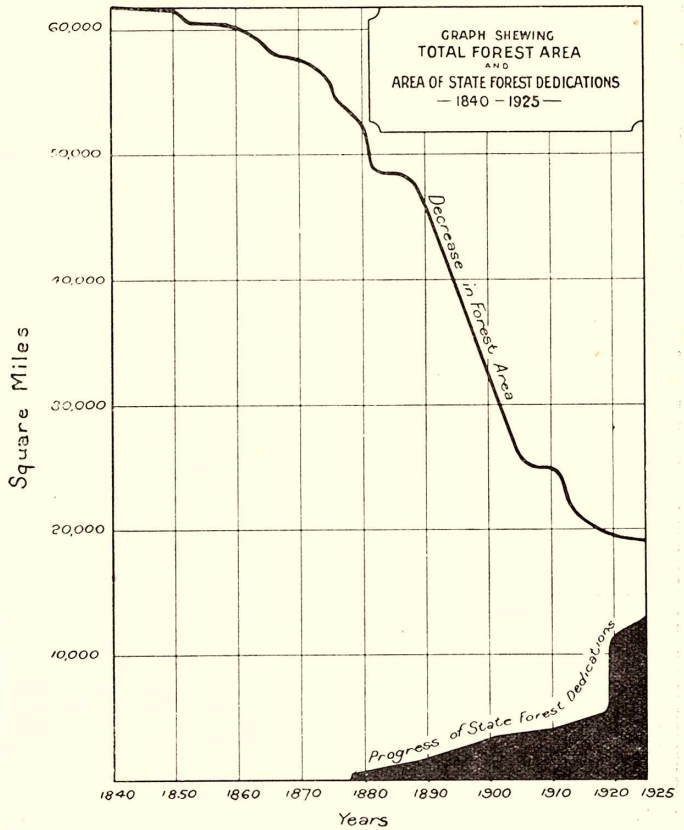
Irrigation areas in Central Otago.

All the above schemes are actually being developed, *i.e.*, construction work is in progress or is nearly completed.

There are other schemes, such as Upper Manuherikia, Miller's Flat, Mount Ida, Arrow River, and Roaring Meg, and several others which are being investigated or are in contemplation.

APPENDIX VI.

GRAPH OF FOREST AREA.



By authority of the N.Z. State Forest Service.

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MAP OF THE

SOUTH ISLAND

(NEW ZEALAND)

SHOWING

MAIN HIGHWAYS

AS DECLARED

(See Main Highways Act N.Z. 1922)

Scale of Miles

0 5 10 20 30 40 50 60 70 80 90

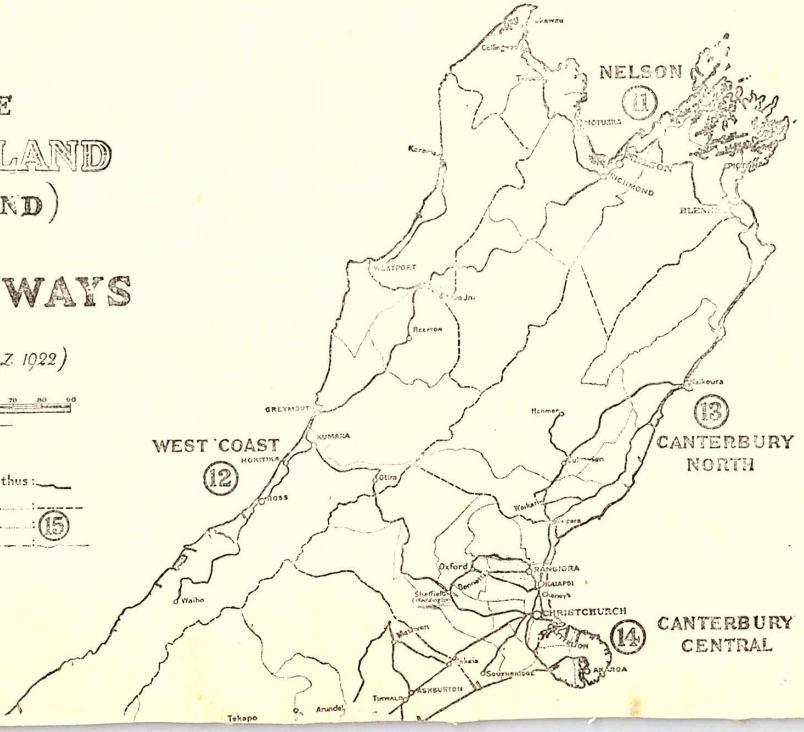
Reference

Main Highways ..... thus :

Boundaries of ..... Dists. .....

Numbers of ..... Dists. ..... : (15)

County Boundaries .....



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